KNOWLEDGE-CENTRIC CAPABILITIES: A CONFIGURATIONAL APPROACH

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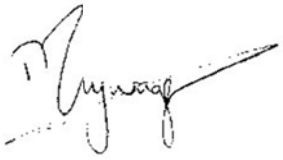
DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the authorship owner thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.



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ABSTRACT

During the past 15 years knowledge management has emerged as a key new organisational practice with numerous organisations implementing processes aimed at facilitating knowledge creation, integration and sharing. With knowledge management positioned as a strategic imperative, numerous studies have explored its resource-base and management alternatives. These studies have played an important role in establishing knowledge management as a field of inquiry within the business sciences, but a number of weaknesses put knowledge management at risk of becoming another passing fad. Previous research tends to prescribe a tool, method or way of looking at knowledge while disregarding any differences in organisational context and displaying little attempt to differentiate organisations in a meaningful way. This assumed homogeneity constitutes a deficiency in knowledge management research.

The knowledge-based view of the firm emphasises distinct knowledge as the key source of firm heterogeneity, and the role of the organisation as that of knowledge creation. This view largely ignores the personal and social nature of knowledge, and the role of the firm in providing the organisational context for creating, sharing and integrating knowledge. Knowledge management, as an embodiment of the knowledge-based view, thus also fails to explore organisational context as a possible source of competitive advantage, thereby limiting the potential of knowledge management initiatives.

The central theme of the study is that the *capacity* to provide an *institutional context* for the creation, sharing and integration of knowledge, henceforth the *knowledge-centric capability*, rather than distinct knowledge, is the key strategic resource of the organisation. The objective of the study therefore is to understand how different knowledge-centric capabilities configure in different organisational contexts. The objective is achieved by addressing three research questions, namely what dimensions can be used to describe a knowledge-centric capability, what configurations of knowledge-centric capabilities emerge in different organisational contexts, and why do specific configurations of knowledge-centric capabilities emerge in specific organisational contexts?

Considering the philosophical foundations of the study, namely knowledge as personal, social and context-specific and the organisation as an open, adaptive system, the study follows a social constructionist research philosophy.

The study's focus on identifying emerging patterns or configurations of knowledge-centric capabilities necessitates a configurational research approach. This allows the study to move beyond uncovering relationships that hold across all organisations, affording the opportunity to identify multi-dimensional constellations of conceptually distinct characteristics that commonly occur together.

A sequential mixed-method research methodology is employed to address the research objective and research questions. First a conceptual framework is developed from the extant literature in order to identify the dimensions of a knowledge-centric capability. Next a theory-driven survey, based on the dimensions of the conceptual framework, is employed to obtain data from which the configurations of knowledge-centric capabilities are derived using cluster analysis. Finally, four case studies are presented to explain the emergence of the configurations within specific organisational contexts.

This research is important for two main reasons. First, it addresses the identified shortcoming of existing research by providing a mechanism to explore an organisation's knowledge-centric capability following a context-sensitive approach. Second, the research demonstrates that knowledge-centric capabilities can indeed be used to differentiate between organisations at a strategic level.

OPSOMMING

Die afgelope 15 jaar het kennisbestuur as ‘n belangrike nuwe besigheidspraktyk ontwikkel, met talle ondernemings wat prosesse implementeer wat daarop gemik is om die skepping, integrasie en deel van kennis te fasiliteer. Met die posisionering van kennisbestuur as ‘n strategiese noodsaaklikheid, het verskeie studies die hulpbron-basis en bestuurs alternatiewe ondersoek. Hierdie studies het ‘n belangrike rol gespeel om kennisbestuur as ‘n navorsingsveld te vestig in die bestuurswetenskappe, maar ‘n aantal gebreke laat kennisbestuur die gevaar loop om net ‘n verbygaande gier te word. Bestaande navorsing neig om ‘n instrument, metodiek of manier voor te skryf om na kennis te kyk. Maar terselfdetyd word enige verskille in organisasies se konteks geïgnoreer en is daar min aanduiding van ‘n poging om organisasies op ‘n sinvolle wyse te onderskei. Hierdie veronderstelde homogeniteit vorm ‘n gebrek in kennisbestuur navorsing.

Die kennis-perspektief van die organisasie beklemtoon unieke kennis as die belangrikste bron van firma heterogeniteit, en die rol van die organisasie as dié van kennis skepping. Hierdie uitkyk ignoreer grotendeels die persoonlike en sosiale aard van kennis en die rol van die firma in die voorsiening van ‘n organisasie konteks vir die skep, deel en integrasie van kennis. Kennisbestuur, as ‘n vergestalting van die kennis perspektief, faal dus ook om organisasie konteks to ondersoek as ‘n moontlike bron van mededingings voordeel. Sodoende word die potensiaal van kennisbestuur inisiatiewe beperk.

Die uitganspunt van die studie is dat die kapasiteit om ‘n institusionele konteks te voorsien vir die skeppping, deel en integrasie van kennis, of te wel die kennis-sentriese vermoë, eerder as unieke kennis die kern strategiese helpbron van ‘n organisasie is. Die doel van die studie is dus om te verstaan hoe verskillende kennis-sentriese vermoëns konfigureer in verskillende organisasie kontekste. Die doel word behaal deur drie navorsingsvrae te adresseer, naamlik watter dimensies kan gebruik word om ‘n kennis-sentriese vermoë te beskryf, watter konfigurasies van kennis-sentriese vermoëns tree na vore in verskillende organisasie kontekste en waarom tree spesifieke konfigurasies van kennis-sentriese vermoëns na vore in spesifieke organisasie kontekste?

Met inagneming van die filosofiese grondslag van die studie, naamlik kennis as persoonlik, sosiaal en konteks-spesifiek en die organisasie as ‘n oop, aanpasbare stelsel, volg die studie ‘n sosiaal konstruksionistiese navorsingsfilosofie.

Die studie se fokus op die identifisering van patrone en konfigurasies van kennis-sentriese vermoëns, noodsaak ‘n konfigurasionele-benadering tot die navorsing. Dit laat die studie toe om verder te gaan as om bloot verwantskappe te identifiseer wat vir alle organisasies geld, en stel die studie in staat om multi-dimensionele konstellasies van konseptueel-unieke eienskappe wat tipies saam voor kom te identifiseer.

‘n Sekwensieële gemengde metode navorsingsmetodologie is gebruik om die navorsingsdoel en navorsingsvrae te addresseer. Eerstens is ‘n konseptuele raamwerk uit die bestaande literatuur ontwikkel om sodoende die dimensies van ‘n kennis-sentriese vermoë te identifiseer. Volgende is ‘n teorie-gedrewe vraelys, gebaseer op die dimensies van die konseptuele raamwerk, gebruik om die data te versamel waaruit die konfigurasies van kennis-sentriese vermoëns met die gebruik van trosanalise. Laastens is vier gevallestudies ontwikkel om die figurering van die konfigurasies binne spesifieke organisasie kontekste te verduidelik.

Hierdie navorsing is belangrik vir twee bepaalde redes. Eerstens adresseer dit die geïdentifiseerde tekortkoming van bestaande navorsing deur ‘n meganisme te voorsien waarmee ‘n organisasie se kennis-sentriese vermoë ondersoek kan word, deur ‘n konteks-sensitiewe benadering te volg. Tweedens demonstreer die navorsing dat kennis-sentriese vermoëns inderdaad gebruik kan word om op ‘n strategiese vlak tussen organisasies te onderskei.

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Soli Deo gloria.

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CHAPTER 1
INTRODUCTION

1.1 Background to the research

Managing knowledge is not a new phenomenon. Knowledge about discoveries made thousands of years ago, passed on through generations through storytelling, apprenticeships and in written form, has led to the rise of the modern industries we know today. Sharing know-how and exchanging ideas lead to the creation of new knowledge, and applying the new knowledge to common problems have resulted in countless innovations through the past few centuries.

Over the past decade it became apparent that the industrial era has entered the end of its lifecycle. During this period technological advancements started to emerge that rapidly changed the way in which production was being organised, trade occurred and value was delivered to consumers (Greenspan, 1998). Although the fundamental rules of the economy have not changed, the structure and drivers of the economy have changed and knowledge is increasingly being recognised as a strategic resource. When managers consequently started to shift their attention from physical resources to the more intangible, which includes knowledge, the term knowledge management was coined to describe the emerging discipline of the conscious effort to examine and promote the sharing, use and creation of knowledge in organisations in a formal manner.

Knowledge management, as an embodiment of the knowledge-based view of the firm, is however misinformed about the role of the organisation in a knowledge context. This misconception is as a result of a general lack of understanding of knowledge as a concept, leading the knowledge-based view to emphasise distinct knowledge as the source of firm heterogeneity, and the role of the organisation as that of knowledge creation. This view ignores the personal and social nature of knowledge, and the role of the firm in providing the organisational context for creating, sharing and integrating knowledge, thereby constraining knowledge management performance.

The central theme of this study is that the capacity to provide an organisational context for the creation, sharing and integration of knowledge, henceforth the knowledge-centric capability, rather than distinct knowledge, is the key strategic resource of the organisation.

The philosophical foundations of the study are built on two legs. The first leg addresses the basic question of epistemology, namely what knowledge is, by exploring various theories of knowledge. Following Polanyi's (1966) thinking, at an epistemological level the study views knowledge as personal, context-specific and of two kinds, namely tacit and explicit, but always emerging from tacit knowledge. The nature of personal knowledge is discussed in detail in §2.2.5. Building on Polanyi's (1958, 1966) conception of knowledge, the study further employs Cook and Brown's (1999) conception of organisational knowledge by viewing explicit and tacit knowledge as two distinct forms of knowledge, each doing epistemic work the other cannot. The nature of organisational knowledge is discussed in detail in §2.2.6. The second leg of the philosophical foundation explores the theory of the organisation, particularly looking at the organisation as an open system, inevitably connected to the conditions of its environment. Beer's (1972, 1984) viable systems model is presented as a suitable approach to facilitate goal-seeking and viability in organisations. Organisation theory is discussed in detail in §2.3.

1.2 Justification for the research

With knowledge management being positioned as a strategic imperative, numerous studies have explored its resource-base and its management alternatives. A review (Chauvel & Despres, 2002) of survey research in knowledge management observes little attempt to differentiate organisations in a meaningful way. The group of surveys did not provide any cross-industry analysis and only worked with a European and North American sampling base. This assumed homogeneity constitutes a deficiency in knowledge management survey research. Chauvel and Despres's (2002) findings reflect the tendency in knowledge management literature to prescribe a tool, method or way of looking at knowledge, disregarding any differences in organisational form or circumstance.

These studies and frameworks have played an important role in establishing knowledge management as a field of inquiry within the business sciences and although useful, a number of weaknesses have limited the successful implementation of knowledge management. Most knowledge management frameworks present knowledge management best practices while failing to address contextual differences between organisations. The implication is that knowledge management initiatives often fail, fuelling the fear that knowledge management is simply another passing fad.

To account for contextual differences between organisations, knowledge management frameworks should shift the focus from a best practice to a best fit approach. This means a framework should first provide a mechanism to investigate and understand an organisation's context, and then, based on the context, provide insight into the most suitable approach to knowledge management.

The research presented in this study has not been done before. The main focus of the research is exploratory and covers a broad range of issues with the collection of data in the field of knowledge management and dynamic capabilities. This research is important for two main reasons. First, it provides a mechanism to explore an organisation's knowledge-centric capability with due consideration to its specific context. Second, the study shows how knowledge-centric capabilities can be used to differentiate between organisations.

1.3 Research objective, philosophy and approach

The primary objective of the study is to understand how different knowledge-centric capabilities configure in different organisational contexts.

The objective of the study can be achieved by addressing the following research questions:

- What dimensions can be used to describe a knowledge-centric capability?
- What configurations of knowledge-centric capabilities emerge in different organisational contexts?
- Why do specific configurations of knowledge-centric capabilities emerge in specific organisational contexts?

Considering the philosophical foundations of the study, namely knowledge as personal, social and context specific and the organisation as an open, adaptive system, the research philosophy is social constructionist. This enables the exploration of organisations as a function of a particular set of circumstances, in order to understand how a knowledge-centric capability emerges from the interaction of various organisational entities as a whole, and from the interaction of the organisation as a whole with its external environment.

The study has a strong focus on identifying emerging patterns or configurations of knowledge-centric capabilities. In order to address the research questions, a research approach is needed that moves beyond uncovering relationships that hold across all organisations, and rather focus on multidimensionality and emergence. The study thus follows a configurational research approach, as it affords the opportunity to identify

multidimensional constellations of conceptually distinct characteristics that commonly occur together (Meyer, Tsui, & Hinings, 1993).

1.4 Research methodology

A sequential mixed method research methodology was employed in this study to address the research objective and research questions. First a conceptual framework was developed from the extant literature in order to identify the dimensions of a knowledge-centric ability. Second, a theory-driven survey, based on the dimensions of the conceptual framework, was employed to obtain data from which the configurations of knowledge-centric capabilities were derived. Finally, four case studies were used to explain the emergence of configurations within specific organisational contexts. The data for the case studies were collected through a number of interviews and focus group sessions conducted with a number of survey participants at the qualifying companies. Figure 1.1 presents an overview of the research methodology.

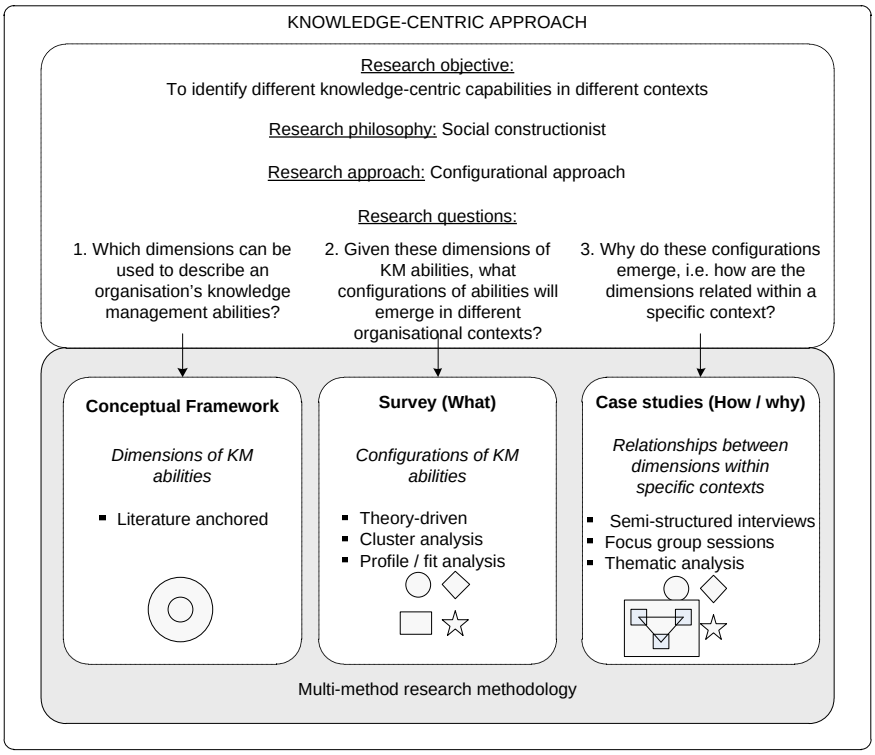


Figure 1.1: Mixed method research methodology

Further discussion and detail on the methodology is presented in Chapter 4.

1.5 Dissertation framework

This dissertation comprises eleven chapters, a list of sources and 6 appendices. The chapter layout is illustrated in Figure 1.2.

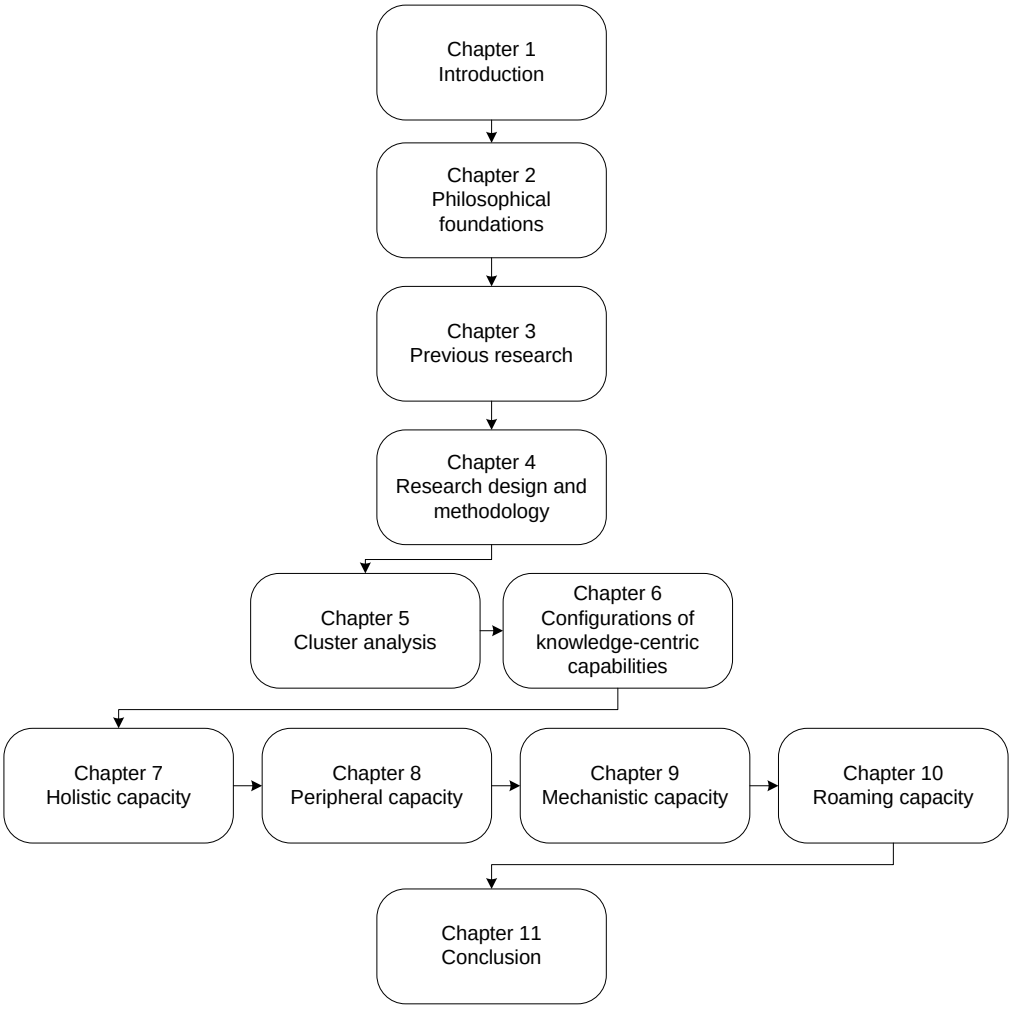


Figure 1.2: Dissertation framework

Chapter 2 presents the philosophical foundations of the study by exploring three key concepts, namely theory of knowledge, organisational knowledge and organisational theory. The traditional theory of knowledge is shown to be an individualist analysis of knowledge with no consensus on the source of knowledge mostly concentrating on propositional knowledge. Polanyi's conception of knowledge is shown to be personal and context-specific, addressing both propositional and practical knowledge. This provides a solid theoretical foundation for organisational knowledge with explicit and tacit knowledge being viewed as

two distinct types of knowledge, each doing epistemic work the other cannot do, similar to the distinct epistemic roles of individuals and groups. The chapter concludes by outlining the basic tenets of the organisations-as-systems view and presents the Viable Systems Model as an alternative organisations-as-systems approach.

Chapter 3 lays the theoretical foundation for the study by reviewing previous research in the field of knowledge management, highlighting existing gaps and explaining how the study extends existing research and addresses the identified gaps. The chapter then reviews the origin and foundations of the knowledge-based view as an extension of the resource-based view of the organisation, highlighting inherent shortcomings. Dynamic capabilities are shown to address the shortcomings of the resource-based view. The concept of knowledge-centric capabilities is then proposed as the source of an organisation's competitive advantage. A conceptual framework of knowledge-centric capabilities is presented and mapped to the Viable Systems Model, showing that the underlying structure of the framework meets the criteria of a viable system. The presentation of the conceptual framework of knowledge-centric capabilities addresses the first research question, namely which dimensions can be used to describe an organisation's knowledge-centric capabilities.

Chapter 4 presents the research design and methodology. The research philosophy and approach is explained at the hand of social constructionism and configurational theory, while a discussion of the multi-method research strategy explains how the remaining research questions were addressed. The discussion explains how a survey and cluster analysis was employed to address the second research question of what configurations of knowledge-centric capabilities would emerge in different organisational contexts. Chapter 4 also explains how case studies were used to address the third research question, namely why the configurations of knowledge-centric capabilities emerged in different organisational contexts.

The results and findings of the study are discussed next. First the results of the cluster analysis are presented in two chapters. Chapter 5 presents the results of the final four-cluster solution. The discussion contains a detailed explanation of the two-staged approach that was followed to derive the cluster solution, as well as how the validation of the results shows that the four-cluster solution is stable and supported empirically. Chapter 6 then presents the interpretation and profile analysis of each of the four clusters that were used to derive a descriptive name for each cluster. In concluding the cluster analysis process, the second

research question, namely what configurations of knowledge-centric capabilities will emerge in different organisational contexts, is addressed.

Having developed an understanding of the differences between the various clusters, the study turns to addressing the third research question, namely why the different configurations of knowledge-centric capabilities have emerged in different organisational contexts. Chapters 7 to 10 each discusses one of the four clusters by presenting a case study that was conducted to develop an understanding of the interrelationships between the various dimensions, in order to explain the emergence of different knowledge-centric capabilities.

The study is concluded in Chapter 11 with a summary of the findings, and a discussion of the study's limitations, recommendations for future research and a discussion of the contribution of the research.

CHAPTER 2
PHILOSOPHICAL FOUNDATIONS

"The philosophy of one century is the common sense of the next."

Henry Ward Beecher

2.1 Introduction

The knowledge-based view of the firm emphasises distinct knowledge as the key source of firm heterogeneity, and the role of the organisation as that of knowledge creation. This view largely ignores the personal and social nature of knowledge, and the role of the firm in providing the organisational context for creating, sharing and integrating knowledge. Knowledge management, as an embodiment of the knowledge-based view, thus also fails to explore organisational context as a possible source of competitive advantage, thereby limiting the potential of knowledge management initiatives. The central premise of the study is that the capacity to provide an institutional context for the creation, sharing and integration of knowledge, henceforth the knowledge-centric capability, rather than distinct knowledge, is the key strategic resource of the organisation.

The purpose of this chapter is to lay the philosophical foundation for the study by exploring key concepts, as illustrated in Figure 2.1. Before exploring the concept of a knowledge-centric organisation in Chapter 3, one needs to ask 'what is knowledge?' and 'what is an organisation?' In addressing the first question, this chapter thus explores the concept of knowledge. Philosophers and scientists have debated the nature of knowledge since ancient times yet there still is no consensus among the myriad of theories. A better understanding of the complex nature of knowledge could therefore assist in laying a foundation for knowledge management as a discipline. In order to develop such an understanding, it is necessary to trace the discussions on the concept of knowledge right back to its roots in philosophy. An overview is provided of epistemology as the traditional, largely individualistic, analysis of knowledge. The subject area of epistemology is introduced and some key theories of knowledge are discussed briefly. The review of epistemology concludes with an introduction to one of the more contemporary theories of knowledge. Personal knowledge is introduced and positioned as an alternative to the traditional and modernist theories of knowledge, highlighting the personal nature of knowledge and introducing the concept of tacit and explicit knowledge.

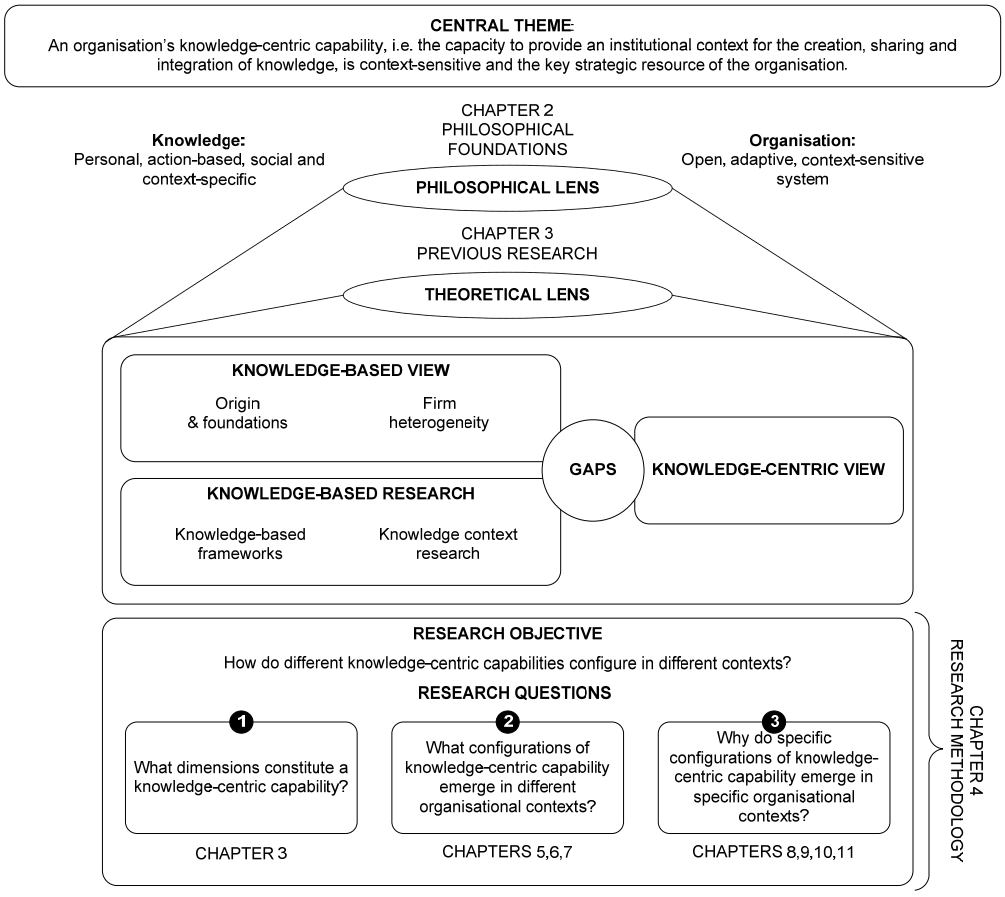


Figure 2.1: Philosophical lens of Chapter 2

The second question is answered by exploring organisational theory. In this study the organisation is viewed as an open, adaptive and goal-seeking system. The strengths and weaknesses of the organisations-as-systems view are explored and the viable systems model is then presented as an alternative approach that facilitates goal seeking and viability while addressing the weaknesses of the traditional organisations-as-systems approach.

The two concepts of personal knowledge and organisations-as-systems form the cornerstone of the framework for Chapter 3.

2.2 The theory of knowledge

2.2.1 Introducing epistemology

Epistemology, or the theory of knowledge, is the branch of Western philosophy that explores the origin, structure, methods and validity of knowledge. Although there are numerous and varying theories of knowledge, there is definite agreement about what the basic questions of

epistemology are (De Rose, 2005; Greco & Sosa, 1999; Hetherington, 1996; Honderich, 2005; Steup, 2006b).

The first question of epistemology is ‘what is knowledge?’ and is concerned with ‘justified true belief’ as the nature and sufficient conditions of knowledge. The second question is ‘what can we know?’, and is concerned with different varieties knowledge. The third question is ‘how do we know what we know?’, and is concerned with the ways in which knowledge is acquired.

Philosophers distinguish between different types of knowledge, particularly factual or propositional knowledge, knowledge of acquaintance and practical knowledge. Factual knowledge refers to knowing that something is the case. If an individual were to state that the moon orbits the earth, it could be considered an example of factual knowledge. An important characteristic of factual knowledge is that it can easily be expressed in language.

Knowledge of people and places are referred to as knowledge of acquaintance. For example, an individual may have knowledge of London by virtue of having visited it. Unlike factual knowledge however knowledge of acquaintance need not involve the capacity to verbally express what it entails. For example, a person may know the taste of an apple without being able to describe the taste in words to another person.

Practical knowledge is often also referred to as “know-how” and is the knowledge of how to do something. Practical knowledge involves the capacity to perform a certain kind of activity, but as with knowledge by acquaintance, practical knowledge need not involve having an explicit understanding of what the performance of the activity entails. For example a person may know how to swim, without being able to explain it to another person.

The difference between these types of knowledge is also recognised linguistically in many languages. For example knowledge of acquaintance translates to *connaître* in French, *kennen* in German, *conoscere* in Italian, and *ken* in Afrikaans, while know-how translates to *savoir*, *wissen*, *sapere*, and *weet* respectively. In modern English, however, both are referred to as *know*.

Although knowledge of acquaintance and practical knowledge are of epistemological interest as well, the traditional analysis of knowledge as a justified true belief is mostly concerned with propositional (*know-that*) knowledge.

2.2.2 Knowledge as a justified true belief

Plato's dialogue the *Theaetetus* or *The Republic* (Jowett, 2001; Plato, 2008) offers a discussion of the question "what is knowledge?" between Socrates, Theaetetus and Theodorus and is considered to be the origin of the traditional definition of knowledge as a justified true belief. The three conditions for knowledge, often referred to as the 'JTB' or 'justified true belief' account, can be expressed by saying that if someone knows a proposition, the person must *believe* the proposition, it must be *true*, and it must be *justified* (Cardinal, Hayward, & Jones, 2004).

Proposition	Condition	Example
S knows that *p* if and only if:		Galileo knows that the Earth moves around the Sun if and only if:
i. *p* is true;	Truth condition	The Earth does indeed move around the Sun.
ii. *S* believes that *p*;	Belief condition	Galileo believes the Earth moves around the Sun.
iii. *S* is justified in believing *p;*	Justification condition	Through observation and calculation Galileo observed that the Earth moves around the Sun.

Figure 2.2: The 'justified true belief' analysis of knowledge

Figure 2.2, summarised from the literature, provides an example of the three conditions for knowledge as generally explained in literature on epistemology (Cardinal, *et al.*, 2004; Hetherington, 1996; Honderich, 2005; Steup, 2006a). The example shows that according to the three conditions of knowledge, Galileo could claim that he knows the Earth moves around the Sun if and only if the Earth does indeed move around the Sun (the truth condition), Galileo believes the Earth moves around the Sun (belief condition), and that he was justified in believing so, because he observed that the Earth moves around the Sun (the justification condition).

The analysis of knowledge traditionally aims to state the conditions that are individually necessary and jointly sufficient for propositional knowledge (Steup, 2006a).

Truth is almost universally accepted as a condition for knowledge (Steup, 2006a). The truth condition means that for a person to know a proposition, the proposition has to be true. Objections to this condition assert that people often claim to know something that turns out to

be false, for example before the 16th century people claimed to know that the sun and other celestial bodies orbit the earth, their justification being that they observed the sun rising in the east and setting in the west.

Using the three conditions for knowledge to evaluate the proposition it can be asserted that the proposition is not knowledge, but considering the period, rather a well justified but false belief.

The proposition doesn't comply with the condition of truth. Thinking one knows something, or having a belief about something, even if the belief is justified, is not the same as actually knowing it. Truth is a necessary condition for knowledge.

The belief condition means that for a person to know a proposition, the person has to believe the proposition. The belief condition however is not as widely accepted as the truth condition (Cardinal, *et al.*, 2004; Hetherington, 1996; Steup, 2006b). Some philosophers argue that knowledge without belief is possible, using Radford's example (1966) of a student who correctly answers a question about the date of the death of Elizabeth I as 1603 without believing that he knows the correct answer. Radford (1966) makes two claims about the example. The first is that the student does not believe Elizabeth I died in 1603 because he thinks he doesn't know the answer to the question. He thinks his answer is merely a guess and therefore doesn't trust it. The second claim is that the student knows the answer because he has learned the fact, but has forgotten that he has learned it. Radford (1966) thus argues that knowledge without belief is indeed possible. The main premise of the counterargument to Radford's claim is that the example doesn't qualify as a case of knowledge without belief because it isn't a case of knowledge to begin with (Steup, 2006a). If, as Radford (1966) states, the student thinks he doesn't know the answer to the question, it means that he has no justification for knowing which is the third condition for knowledge.

The justification condition applies to the truth of a belief (Hetherington, 1996), in other words a person who claims to know a proposition must be justified to belief that it is true. Most epistemologists would agree that a belief which turns out to be true without justification is mere epistemic luck which doesn't qualify as knowledge (Steup, 2006a). For example, suppose a father hides a marble in one of his hands behind his back and asks his son whether he knows in which hand the marble is. The son believes the marble is in his father's right hand, which turns out to be true. Unless the son's belief was justified, it cannot be considered as knowledge but only epistemic luck. But if, for example, the son saw in a mirror that his

father put the marble in his right hand, his belief qualifies as knowledge, because his belief was justified and true. Knowledge is therefore distinguished from true belief by being justified.

The three conditions for knowledge, justified true belief, have above been shown to be individually necessary for propositional knowledge. If it is accepted that this traditional account of knowledge is correct, the next aim of the analysis of knowledge is to test whether the conditions are jointly sufficient for propositional knowledge. In a short paper Gettier (1963) presented examples of beliefs which are true and apparently justified but which would typically not be considered knowledge. These examples accepted that the three conditions were individually necessary, but questioned whether they were jointly sufficient for propositional knowledge. Gettier's (1963) and subsequent examples have become known as the Gettier problem. One example is a person who looks at a watch, which gives the time as 10 o'clock, and so the person comes to believe it is 10 o'clock. The fact is that it is 10 o'clock. A watch is generally good justification to know the time so this is an example of a justified, true belief. However, in reality the person's watch has stopped and the fact that it was telling the correct time when the person looked at it is mere coincidence. The example illustrates that it could be said that the person had a justified true belief about the time, but that it cannot be said that the person had knowledge about the correct time.

From the Gettier cases it seems something more needs to be added to justified true belief to be considered knowledge, and this is where epistemologists are in total disagreement. The epistemological theories resulting from these disagreements attempt to address the sources of knowledge, in other words how knowledge is acquired, and are either based on a strategy of strengthening the justification condition or on providing a suitable further condition to justified true belief (Steup, 2006a).

2.2.3 Sources of knowledge

For a true belief to be considered as being justified and therefore as knowledge, the source from which it originates must be considered to be a reliable source. Epistemologists have widely varying theories about what could be considered to be reliable sources of knowledge.

The main sources of knowledge are reason, perception, memory and introspection (Hetherington, 1996; Honderich, 2005), as illustrated in Figure 2.3.

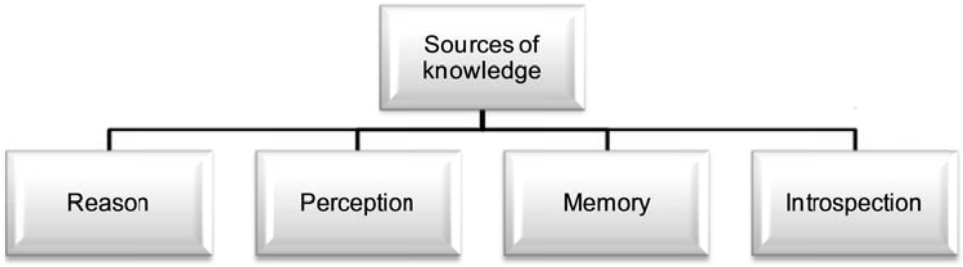


Figure 2.3: The main sources of knowledge

Rationalism views reason as the primary source of knowledge. Rationalists adopt at least one of a number of theses regarding the source of knowledge. The first is the *Intuition/Deduction* thesis which states that some knowledge is knowable by intuition alone (Honderich, 2005; Markie, 2004). Intuition is considered to be a rational insight and conclusions are made through a process of deduction from intuited premises through valid arguments, meaning the conclusion must be true if the premises are true. The second thesis is the *Innate Knowledge* thesis which asserts that as part of our rational nature we have knowledge of some truths (Honderich, 2005; Markie, 2004). Innate knowledge is not acquired through either sense experience or intuition and deduction, but simply part of our nature. A further thesis is the *Indispensability of Reason* thesis which claims that experience cannot provide what is gained from reason (Honderich, 2005; Markie, 2004). The *Superiority of Reason* thesis asserts that reason is superior to experience as a source of knowledge (Honderich, 2005; Markie, 2004). Rationalism does not deny that the senses provide important information about the world, but also does not consider them to be the sole source of knowledge. They largely view knowledge as *a priory* knowledge, meaning it is gained or justified by reason alone, without the direct or indirect influence of any particular experience. Criticism against rationalism is that it gives no knowledge of contingent truths, no empirical knowledge and no knowledge of natural sciences (Cardinal, *et al.*, 2004).

Empiricism, as opposed to rationalism, views experience or perception as the only source of knowledge. Experience is obtained through the five senses, namely sight, touch, hearing, smelling and taste. Empiricists believe people are born knowing nothing and that over time knowledge is acquired through experiences. A number of criticisms could be raised against empiricism. The first is that empiricists insist that genuine knowledge come from immediate and present experience or from acquaintance with sense data, which would mean that knowledge of past and historical events is impossible. It would also be difficult for empiricists to account for *a priori* knowledge such as mathematics and logical truths. A

further criticism against empiricism is that data obtained through the senses are not always certain. The world is not always as it is perceived by the senses and therefore any knowledge acquired through the senses cannot necessarily be considered to be reliable.

Introspection is another cognitive function considered by some epistemologists to be a reliable source of knowledge. Introspection is the capacity to inspect one's own mind and in the process it reveals how the world appears to an individual (Steup, 2006b). A fair amount of disagreement exists between epistemologists regarding the infallibility of introspection.

Memory is another source of knowledge, referring to the capacity to retain knowledge acquired in the past, of both past events and present facts. There is no disagreement about the fact that memory is fallible, but the epistemological question instead relates to what makes a memory a source of justification. Coherentists believe memory is a source of justification only if a person has reason to think the memory is reliable. Externalists again believe that memory is a source of justification only if it is in fact reliable.

From the above discussion it is apparent that the conditions under which the various sources of knowledge could be considered reliable remain an open debate.

2.2.4 Towards a synthesis

The era of modern philosophy however started out with mainly two opposing schools of philosophy, namely Rationalism and Empiricism, as illustrated in blocks A and B in Figure 2.4 which is a synthesis of the literature. Modern and contemporary philosophy continued the epistemological debate through various theories. Kant's (2010) thoughts in Critique of Pure Reason, first published in 1781, were the first to move philosophy beyond the debate between empiricists and rationalists. Kant argued that knowledge emerges when both the sensory experience of empiricism and the logical thinking of rationalism work together.

According to Kant, the mind is active in ordering sensory experiences that occur in the outer world, supplying the concepts by means of which experiences can be understood (Russel, 2000: 680). He believed that an object cannot be known as "a thing in itself", but only as a sensory perception of the object, which transcends experience, presented in block D. These thoughts formed the basis of his theory of perception, which became known as transcendental idealism (Delius, Gatzemeier, Sertcan, & Wünscher, 2000; Honderich, 2005).

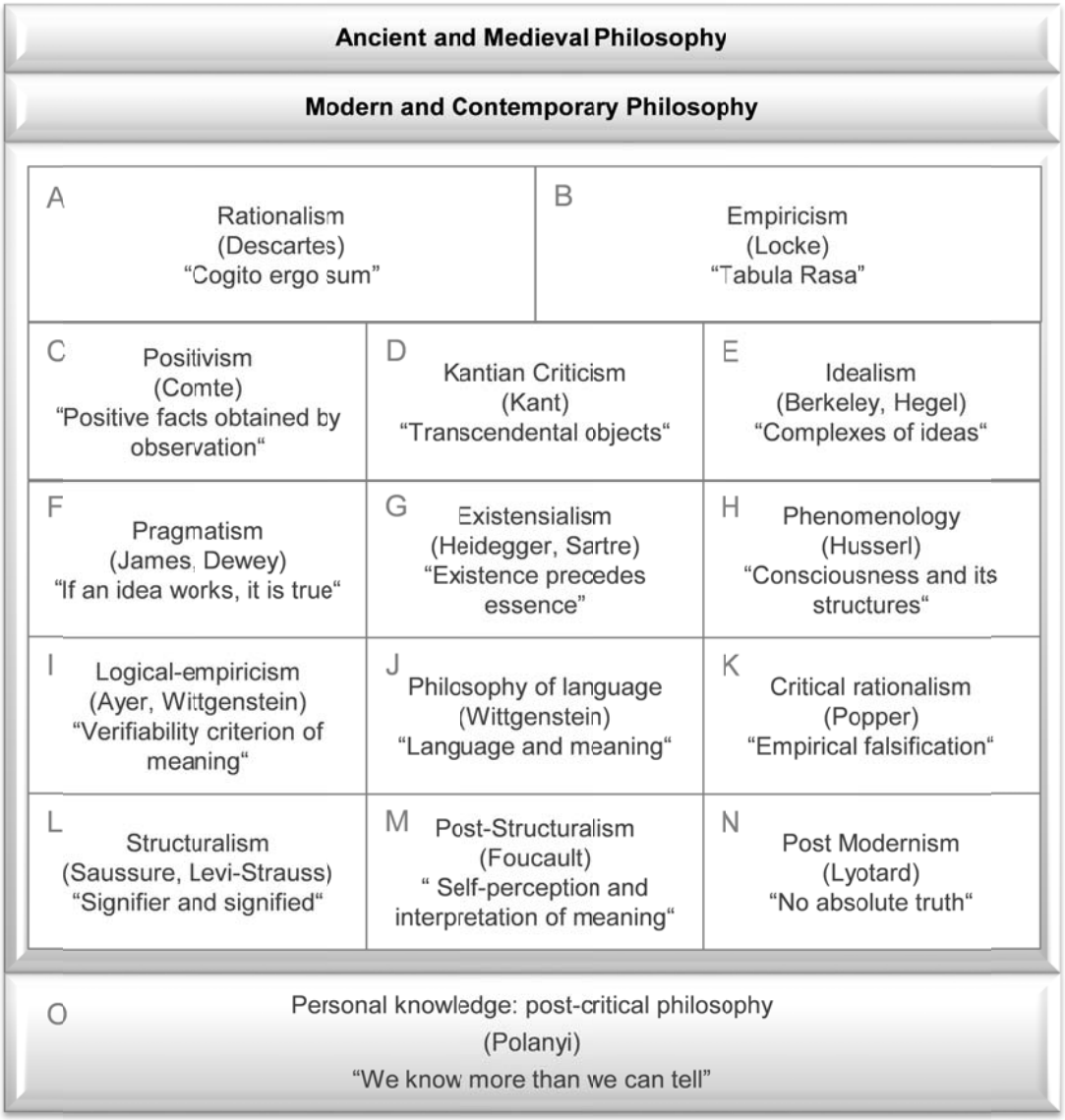


Figure 2.4: Modern and contemporary theories of knowledge

Idealism (block E) describes the view that reality is dependent on the mind, and in its philosophy of perception it believes the material world does not exist outside of the mind (Cardinal, *et al.*, 2004). It therefore sees things as complexes of ideas, and Hegel's absolute idealism regards thought and ideas as the sole truth and reality (Delius, *et al.*, 2000). Positivism on the other hand rejects metaphysical speculation of truth, viewing actual sense experience as the only source of knowledge (Delius, *et al.*, 2000). Positivism (block C) further claims that justification of knowledge can only come through strict scientific method (Delius, *et al.*, 2000). Pragmatism (block F) is closely related to positivism and views knowledge as an interaction between human action, experiment and experience. Pragmatism is critical against the traditional notion of truth, believing there are no ultimate truths. Dewey

believed truth cannot be seen as an image of reality, and that it is not independent of context, people and events.

Phenomenology (block H) attempts to improve the idealist view that ‘to be is to be perceived’, by claiming that ‘to be is to be perceivable’ (Cardinal, *et al.*, 2004). Phenomenology views objects not just as collections of actual sense data, what is called phenomena or appearances, but also of possible ones. It believes perception cannot be understood as mere processing of sensory data, or in an idealist fashion as the outcome of constitutive processes in consciousness. Perception is viewed as an active process in which a subject discovers the world through reflection. Existentialism (block G) developed from phenomenology, further emphasising the relationship between knowledge and action. Where phenomenologists believe knowledge is acquired through reflection, existentialists emphasise acting toward an end. Its central proposition is that existence precedes essence, meaning individuals create the essence and meaning of their lives, as opposed to it being created for them.

Logical positivism (block I), later called logical empiricism, also made an attempt to combine empiricism and rationalism by exploring the relationship between language and reality. Propositions were seen as meaningful only if the conditions under which they were true could be stated. This became known as the verification principle of meaning (Delius, *et al.*, 2000). Wittgenstein, whose *Tractatus Logico-Philosophicus* (2001) was the manifesto of logical positivism, later revised his position in his *Philosophical Investigations* (1958) which was published after his death. He no longer viewed reality as given, independently of language, and merely “pictured” by it. He was now of the view that there was no single correct description of the world, but rather that the correct description depended on which language rules, or language games were being used. This work gave a new direction to 20th century philosophy. Wittgenstein’s philosophy of language (block J) emphasised complex practical contexts, with its scientific description merely one of many possible descriptions.

Critical rationalism (block K) developed as a theory of science questioning how knowledge can be obtained through observation at all. The school of thought rejects classical empiricism and holds that knowledge is hypothetical and is generated by the creative imagination in order to solve problems that have arisen in specific contexts. In *The Logic of Scientific Discovery* (2002) first published in 1934, Popper explained that no number of positive

outcomes at the level of experimental testing can confirm a scientific theory, but that a single counterexample can disprove or falsify a theory.

Structuralism (block L) studied the underlying structures inherent in cultural products, using analytical concepts to understand and interpret those structures. Structuralism opposed the existentialists' central position of the subject, intending to show that it is anonymous processes which create the illusion of the autonomous subject. Post structuralism (block M) developed as a critique of structuralism. Specifically, post-structuralism holds that the study of underlying structures is itself culturally conditioned and therefore subject to myriad biases and misinterpretations. To understand an object (e.g. one of the many meanings of a text), it is necessary to study both the object itself, and the systems of knowledge which were coordinated to produce the object. In this way, post-structuralism positions itself as a study of how knowledge is produced.

Postmodernism (block N) is a philosophical direction which is critical of the foundational assumptions and structures of philosophy and was heavily influenced by phenomenology, structuralism and existentialism. Postmodernism rejects the notion of an objective epistemology, regarding human knowledge as historically conditioned. Two approaches to postmodernism have emerged over time, the one being deconstructive, and the other reconstructive. According to deconstructionists all interpretive efforts, including those that attempt to set the limits and goals of proper interpretation, are based on certain assumptions about the nature of human experience and knowledge, bringing the possibility of true knowledge in doubt. Their scepticism, however, goes beyond traditional scepticism by interpreting this lack of a foundation for knowledge as an opportunity for free interpretation of meaning, rendering any statement as valid as the next. Deconstructive post modernism therefore attempts to overcome the modern worldview by deconstructing or even eliminating the very concepts of traditional philosophy, for example meaning, reason and truth as correspondence. A major criticism against the deconstructionist approach to understanding knowledge, is the circularity of its own reasoning (Gill, 2000), for if it is accepted that one interpretation is as valid as any other, the very statement that this is the case loses all meaning.

The epistemological debates presented here largely focused on propositional (knowing that) knowledge. Practical knowledge (knowing how) however plays and equally important role in

knowledge management. It is therefore necessary to also explore theories of knowledge that address the concept of ‘know-how’.

The second approach to postmodernism is also critical to the assumptions of modern thought, but rather than attempting to deconstruct the worldview, it attempts to reconstruct it by reconsidering the actual meaning and implications (Gill, 2000). Polanyi’s (1958) epistemology of personal knowledge (block O) offers such a reconstructive approach to postmodernism.

Drawing on concepts of perception, existential-phenomenological aspects of action, and concepts of meaning, Polanyi’s (1958) epistemology of personal knowledge rejects the modernist conception of an objective reality detached from human action, instead emphasizing personal participation in knowledge and addresses both propositional or theoretical knowledge, and practical knowledge (Polanyi, 1966: 7).

2.2.5 Personal knowledge

The concept of personal knowledge is based on the premise that we can know more than we can tell (Polanyi, 1966: 4). Since this tacit knowing forms the underlying structure of both practical and theoretical knowledge (Polanyi, 1966: 7), a more in-depth look at this structure is justified. The four aspects of tacit knowing, namely functional, phenomenal, semantic and ontological, are each discussed briefly at the hand of an example used by Polanyi.

In a psychological experiment by Eriksen and Kuethe (1958) whenever a person uttered associations to certain words, the observers administered an electric shock. Soon the person learned to pre-empt the shock by avoiding the utterance of such associations. When the person was questioned, however, he was unaware that he was doing this. The person could not identify the shock-producing associations, yet his awareness of them made him anticipate a shock. Through this example the structure of tacit knowing, as synthesised in Figure 2.5, can be explained.

Polanyi identifies two kinds of tacit knowing, the first kind being the particulars and the second kind the focal target. The person learned to connect the particulars that produce the shock, but this connection remained tacit because the person was focussing on the shock. “He was relying on his awareness of these particulars for the purpose of attending to the electric shock” (Polanyi, 1966: 9).

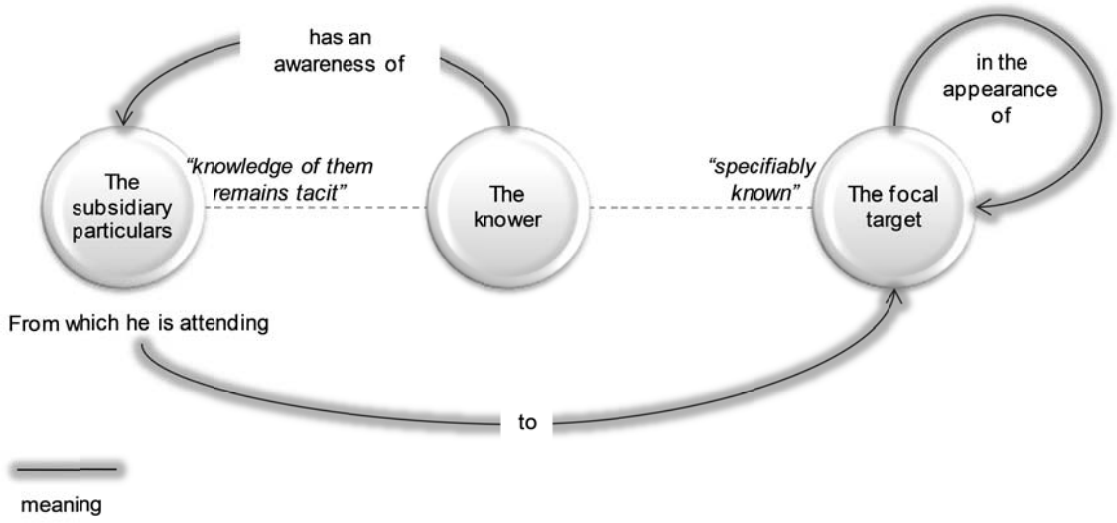


Figure 2.5: The structure of knowledge

The combination of the two kinds of knowing forms the functional structure of knowledge. In the example the electric shock, or focal target, is known by attending to it and therefore it is explicitly known. The shock-producing particulars, however, are only known by relying on an awareness of them for attending to the electric shock and therefore the knowledge of them remains tacit. Additionally, even though the person could not explicitly identify the shock-word associations from the other associations, the person became aware of them in terms of their appearance in an electric shock. This is the phenomenal structure of knowledge.

A combination of the functional and phenomenal aspects of knowledge, gives rise to the third aspect of knowledge. In the example, not uttering a shock-word association resulted in no shock being administered even though the person could not identify the shock-words or associations that triggered the shock. These words were only known in terms of their meaning - the resulting electric shock. It is their meaning to which the person's attention is directed (Polanyi, 1966: 12).

The fourth aspect of knowledge, the ontological aspect, is concerned with what tacit knowing is knowledge of. Tacit knowing establishes a meaningful relationship between the particulars and the focal target, and is therefore the understanding of the comprehensive entity which the two terms jointly constitute (Polanyi, 1966: 13).

Another important feature of Polanyi's theory of human knowledge is that all knowing is personal. "*All* knowing is personal knowing – participation through indwelling" (Polanyi & Prosch, 1975: 44; emphasis in the original). Using the example of a map, Polanyi and Prosch

(1975: 29-30) explain that no matter how elaborate it is, the map cannot read itself and that using the map requires the judgement of a skilled reader who can relate the map to the world through both cognitive and sensual means. He therefore claims that personal judgement cannot be prescribed by rules, but relies essentially on the use of our senses (Polanyi, 1958: 19). Polanyi therefore views the body as the "ultimate instrument of all of our external knowledge, whether intellectual or practical" (1966: 15). This illustrates an important feature of the theory of personal knowledge, namely that the knowledge is not an activity only of the mind, but rather the interplay between the body, through actions, and the mind, through concepts.

The concept of tacit knowing also highlights another important feature of personal knowledge, which is summarised in Figure 2.6. Tacit knowing is achieved by integrating subsidiary particulars in attending to a focal target. This integration of particulars is an interiorisation, meaning that it is not by looking at them, but by dwelling in them, that their joint meaning is understood.

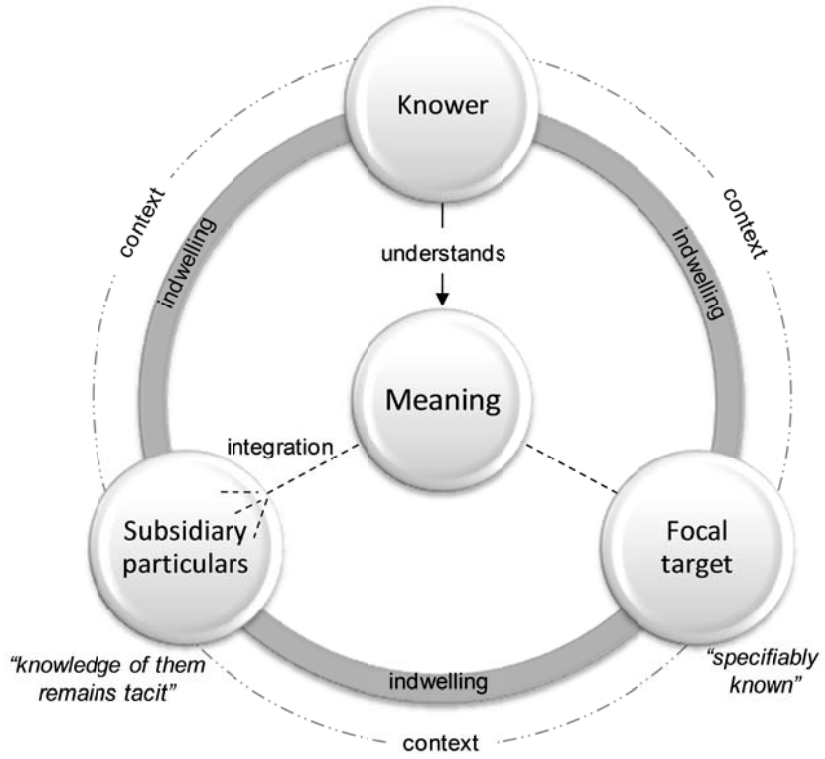


Figure 2.6: Personal knowledge

Using the example of a pianist whose movement can be temporarily paralysed when concentrating attention on his fingers, instead of the music, Polanyi (1966: 18) illustrates how

focusing attention on the particulars of a comprehensive entity can destroy the conception of the entity. The significance of this observation is twofold. First it is important to understand that this does not mean that it is never possible to explicitly state the relationship between particulars at all. Sometimes such explicit integration may be possible, but the more tangible particulars, or explicit knowledge, cannot replace its tacit counterpart, just like having a theoretical knowledge of a motorcar cannot replace the skill of driving a motorcar (Polanyi, 1966: 20).

In other words, tacit knowledge cannot be converted into explicit knowledge. Second it shows that knowledge is context specific. Focussing on particulars cannot be done in the same context of action in which one is unconsciously aware of them. If particulars are examined independently it is done in a new context of action, which in turn is attended to from a new set of subsidiary particulars.

2.2.6 Organisational knowledge

Polanyi's conception of knowledge, discussed in §2.2.5 as being derived from personal participation, context-specific and of two kinds, namely tacit and explicit, but always emerging from tacit knowledge, can make a key contribution in the conceptualisation of organisational knowledge. Management science has drawn on Polanyi's conception of tacit and explicit knowledge quite extensively, particularly in the fields of innovation, knowledge management, organisational knowledge creation and organisational learning (Allee, 1997; Cook & Brown, 1999; Davenport & Prusak, 1998; Easterby-Smith & Prieto, 2008; Leonard & Sensiper, 1998; Levitt & March, 1988; Nonaka, Kohlbacher, Hirata, & Toyama, 2008; Nonaka & Takeuchi, 1995; O'Dell, Grayson, & Essaides, 1998; Tsoukas & Vladimirou, 2001). Upon a closer look, however, it becomes clear that Polanyi's conception of knowledge is often greatly misunderstood.

One of the models used most frequently to define knowledge, depicts knowledge as part of a hierarchy consisting of data, information and knowledge as illustrated in Figure 2.7 (Bennet & Bennet, 2000; Bollinger & Smith, 2001; Davenport & Prusak, 1998; Groff & Jones, 2003; Sanchez, 2001; Skyrme, 1999; Wilson, 1996).

In this model, data are typically defined as the values of observable, measurable or calculable attributes (Firestone, 2001). Davenport and Prusak (1998) explains that data are transformed into information by adding meaning through contextualisation, categorisation and calculation. Information is turned into knowledge if humans add their experience, judgement, values and

beliefs in order to use it for comparison, decision-making and conversations (Davenport & Prusak, 1998). Skyrme (1999) has further incorporated the distinction between tacit and explicit knowledge into the so called knowledge hierarchy, characterising data and information as explicit and knowledge as tacit.

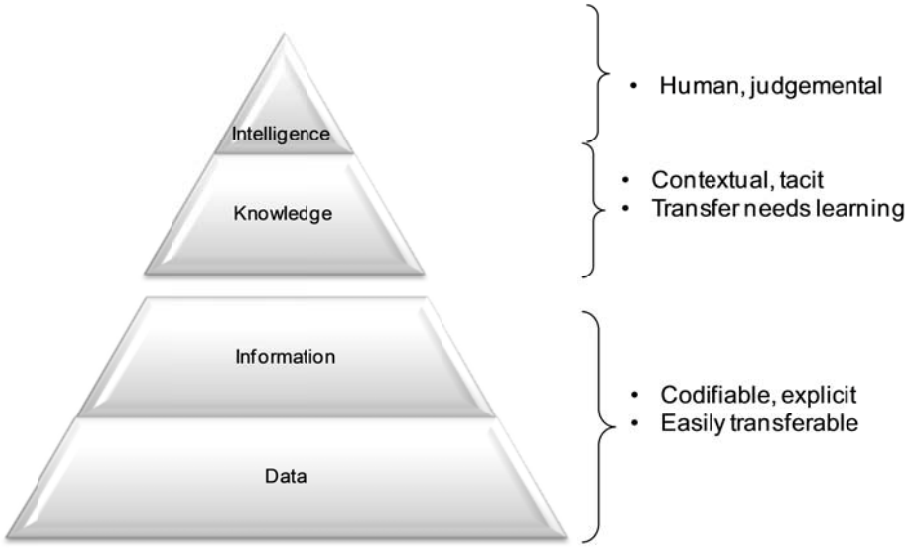


Figure 2.7: The knowledge hierarchy

Source: Skyrme (1999: 47)

The popularity of this model can probably be attributed to the ease with which it can be translated to concepts of data and information in information systems. Although this model recognises the differences between data, information and knowledge, arranging these elements in a pyramid with data, the most plentiful, at the bottom, information produced from data above it, and knowledge produced from information through to intelligence at the top, is problematic.

The hierarchical-model is too rationalistic, claiming that knowledge is some kind of growth from raw data and systematically organised information (Hannabuss, 2001). This claim have fuelled the belief that knowledge, as a commodity and process and activity, can be managed, similar to the way in which information is processed and managed in organisations. Zeleny (1987) argues that people do not simply compute their way through the world, and that the idea that knowledge and mental processes involve structures of symbols and transformations of symbolic expressions is artificial and mechanistic and although suitable for artificial

intelligence, unrelated to human intelligence. Another major criticism that can be levelled against the hierarchical model is that there is no uniform viewpoint regarding its underlying components, as is evident from the varying definitions (Bennet & Bennet, 2000; Bollinger & Smith, 2001; Davenport & Prusak, 1997, 1998; Groff & Jones, 2003; Sanchez, 2001; Skyrme, 1999; Wilson, 1996). Possibly the biggest criticism against the hierarchical model of knowledge is that in its treatment of the concepts of tacit and explicit knowledge, it ignores the notion that all knowledge is derived from tacit knowing, with the knowledge hierarchy implying that tacit knowledge evolves from the explicit. Furthermore, the knowledge hierarchy implies knowledge evolves from information, which possibly derives from the misconception that information and explicit knowing is the same thing. Explicit knowing is a component of personal knowledge, while information can be thought of as the explicated form of that what is known explicitly. Tacit knowledge is also often described as the knowledge a person has in his head, as opposed to explicit knowledge expressed in some form external to the knower. The conflict in such statements is that just like tacit knowing, explicit knowing is a component of personal knowledge, which means it is also embodied in a person. Only when that what is known explicitly is communicated in some form or another does it become information which is external to the knower.

Another prevalent view of the relationship between tacit and explicit knowledge, is viewing it as two distinct, mutually exclusive entities (Groff & Jones, 2003; Hedlund, 1994; Nonaka & Takeuchi, 1995; Spender, 1996a; Wilson, 1996). This dichotomous view of knowledge is one of the most widely used distinctions between tacit and explicit knowledge, and is based on the premise that tacit knowledge can be converted into explicit knowledge. The SECI-model (Nonaka & Takeuchi, 1995) as a spiral of organisational knowledge creation in particular popularised this conception. The SECI-model depicts organisational knowledge creation as a continuous and dynamic interaction between tacit and explicit knowledge, with the notion of knowledge conversion from tacit to explicit knowledge as the cornerstone of the model, as illustrated in Figure 2.8.

The main criticism against this dichotomous view of knowledge is that tacit knowledge cannot be articulated and that the “tacit-to-explicit” cycle of the knowledge-conversion model therefore is flawed. The conception of knowledge as a dichotomy views tacit knowledge as knowledge that has not yet been explicated (Groff & Jones, 2003; Nonaka & Takeuchi, 1995; Spender, 1996a) and the SECI-model proposes that tacit knowledge can be converted into

explicit knowledge through a number of practices, such as metaphor or analogy as proposed by Nonaka and Takeuchi (1995).

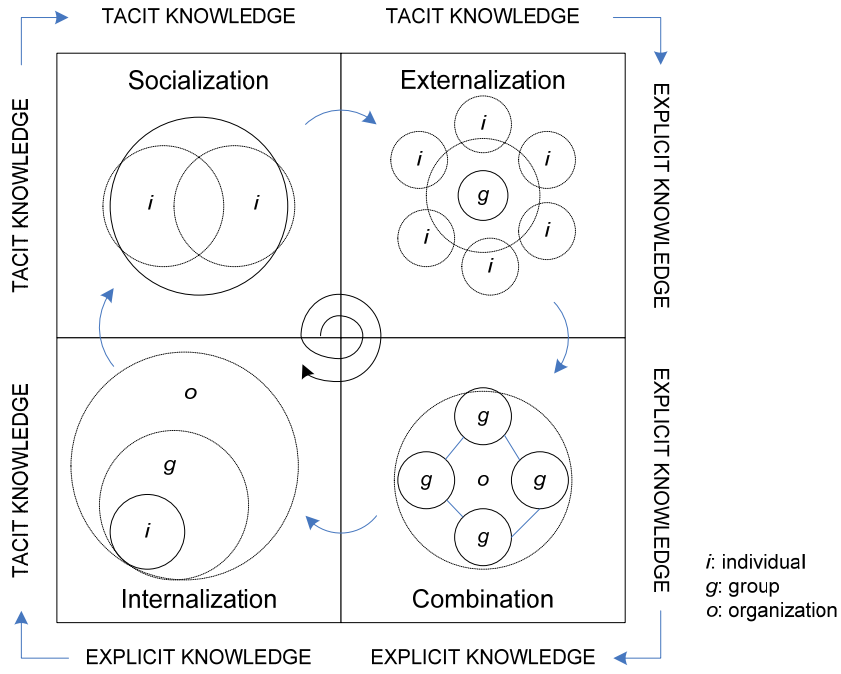


Figure 2.8: SECI-model of knowledge conversion

Source: Nonaka and Konno (1998: 43)

However, tacit knowledge is intrinsically different from explicit knowledge and if converted, tacit knowledge is both changed and diluted during the conversion process (Mooradian, 2005). To treat tacit knowledge as having precisely definable content, which is initially located in the head of the practitioner and then translated into explicit knowledge, as the SECI-model suggests, is to reduce what is known tacitly to what is articulable, thus impoverishing the notion of practical knowledge (Tsoukas, 2003).

Further misconceptions, although more subtle, emerge from the often cited view that tacit and explicit knowledge are two ends of a continuum or a spectrum (Boiral, 2002; Bou-Llusar & Segarra-Ciprés, 2006; Edmondson, Winslow, Bohmer, & Pisano, 2003; Grover & Davenport, 2001; Hall & Andriani, 2003; Lam, 1997; Spender, 1996b). Positioning knowledge in a spectrum implies that knowledge can exclusively consist of that what is known explicitly. As has been discussed earlier, this is in contrast with the notion that all knowledge is derived from tacit knowing (Polanyi, 1958: 17). Depicting tacit and explicit knowledge as the two extremes of a continuum says nothing about the nature of the relationship between the two

forms of knowledge, that is the from-to or “vectorial way” (Polanyi, 1969: 182) of attending to the focal target from the subsidiary particulars. Portraying knowledge as a continuum therefore ignores the personal character of knowledge that transpires in the dynamic interaction between explicit and tacit knowing.

A more apt description of the relationship between explicit and tacit knowledge is that the two forms of knowing are complementary (Swart & Pye, 2002), or two sides of the same coin (Tsoukas, 2003), or that each form of knowledge does work the other cannot do (Cook & Brown, 1999). Explicit knowledge can thus not replace its tacit counterpart (Polanyi, 1966: 20) but can deepen one’s understanding. The fact that even the most explicit knowledge has an underlying element of tacit knowledge does further not mean that one cannot attempt to understand the relationship between the particulars. Focussing on the particulars can just not be done in the same context in which one is subsidiarily aware of them in attending to another focus. This highlights the prevalence of the systems principle of emergence in the concept of knowing. Focussing on particulars means they now become the focal target, and the action of focussing on them brings about a new context which in turn has different underlying particulars. In contemplating the relationship between particulars, one attempts to redefine the distinctions underlying those particulars. This activity is what can draw the attention to previously unnoticed connections between the particulars (Tsoukas, 2003; Weick, 1995) and enable one to express the distinctions. The art of sharing this knowledge therefore lies not in trying to convert tacit knowledge into explicit knowledge, as this cannot be done. The art lies in the manner the knower draws the attention of the receiver to the particulars, in order to see the connections (Tsoukas, 2003; Wittgenstein, 1958). This again confirms the social and context-sensitive nature of knowledge and understanding.

Accepting these conceptions of knowledge and understanding, how can organisational knowledge best be described? The notion that all knowledge involves personal participation implies that all understanding is interrelated to interaction with the physical and social worlds through the body and through speech. In the same way that physical reality can only be known through the body in speech and action, social reality can only be known by functioning in it as part of a community or by participating in its linguistic activity (Gill, 2000). This corresponds to Wittgenstein’s (1958) notion that all knowledge and understanding is in essence collective. Our grasp of meaning and use of language depends on a background of common behaviour and shared practices, not agreement in opinions but in “form of life” (Wittgenstein, 1958). The ability to exercise judgement therefore involves the

combination of an individual's ability to integrate particulars and the individual's location within a collectively generated domain of action (Tsoukas & Vladimirou, 2001). The nature of collective knowledge can thus be described as comprising personal judgement, a collective domain of action and a regard for a specific context.

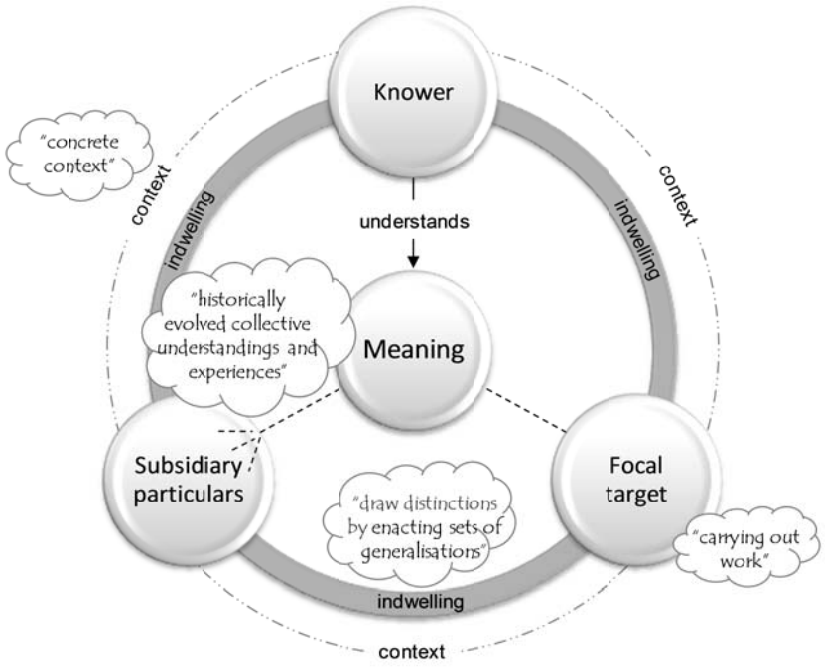


Figure 2.9 Organisational knowledge

The description that "organisational knowledge is the capability members of an organisation have developed to draw distinctions in the process of carrying out their work, in particular concrete contexts, by enacting sets of generalisations whose application depends on historically evolved collective understandings and experiences" (Tsoukas & Vladimirou, 2001: 973) provides a comprehensive view of organisational knowledge that matches the characteristics of personal knowledge as conceptualised by Polanyi (1958, 1966).

Figure 2.9 illustrates how this definition of organisational knowledge can be applied to the model of personal knowledge. In organisational knowledge, the members of the organisation as knower have an understanding of the shared meaning of particulars in attending to their work, within a specific context. This shared meaning arises from the integration of particulars through indwelling in a collective domain of action.

Another conception of organisational knowledge that builds on Polanyi's notion of personal knowledge distinguishes between knowledge as an epistemology of possession, and knowing

as an epistemology of practice (Cook & Brown, 1999). The model, illustrated in Figure 2.10, views explicit and tacit knowledge as two distinct forms of knowledge, each doing epistemic work the other cannot do. Similarly individuals and groups each do epistemic work the other cannot do. For example, while only individual software developers know how to code a program in Java, the knowledge of what constitutes acceptable and unacceptable practice in software development in Java is possessed by Java developers as a group. No single individual in a group possess all the knowledge in the body of knowledge held in common by that group.

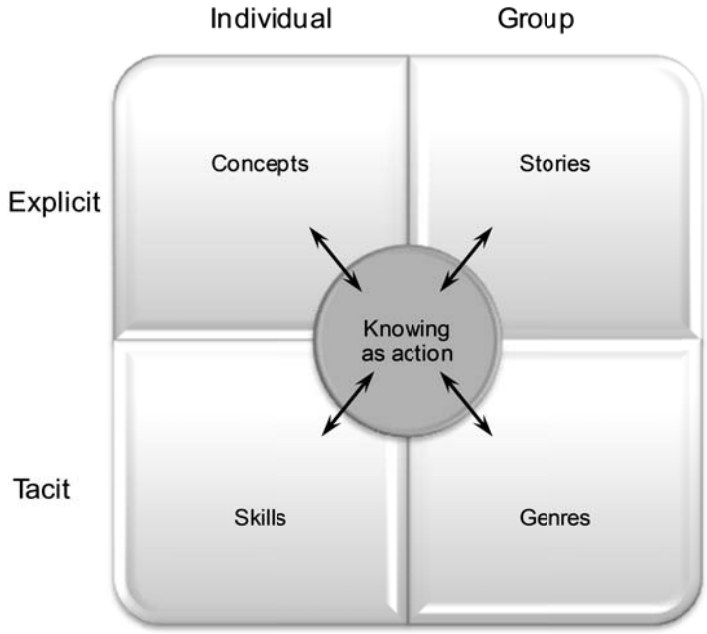


Figure 2.10 Knowledge and knowing

Source: Cook and Brown (1999: 393)

The four kinds of knowledge emerging from the explicit/tacit and individual/group distinctions each identifies a unique and irreducible form of knowledge and represents an epistemology of possession (Cook & Brown, 1999). The conception of knowing as an epistemology of practice or action (Cook & Brown, 1999) corresponds with Polanyi's notion that "all knowing is personal – participation through indwelling" (Polanyi & Prosch, 1975: 44).

The conception of knowledge as set out above has significant implications for a knowledge-based view of the firm. The study agrees with the view that knowledge is personal, comprising two distinct, complementary forms namely explicit and tacit knowledge each

doing epistemic work the other cannot. This study thus contends that the aim of knowledge management should not be to convert tacit knowledge into explicit knowledge, as this cannot be attained. Instead knowledge management should concentrate on creating shared mental models about concepts within the organisation. In Chapter 3 the study further argues that the role of the organisation from a knowledge-based perspective is to provide the proper environment and context for facilitating activities and learning at the group level, and knowledge creation and accumulation at the individual level. Before the role of the organisation can be investigated from a knowledge-based perspective, however, it is necessary to first understand the second key concept of the study, namely the organisation. A number of key principles of organisation theory is therefore examined next in §2.3.

2.3 Organisation theory

2.3.1 What is the organisation?

The word “organisation” is derived from the Greek word “organon”, in turn derived from the word ”ergon” which means “work” or “task”. A number of definitions exist for the term organisation. For the purpose of this study, Daft’s (1983) definition of an organisation as a social entity that is goal orientated, and designed as a deliberately structured and coordinated activity system, linked to the external environment, is used.

Organisation theory studies organisations from multiple perspectives, mainly at four levels of analysis, i.e. the individual level, the group level, the organisation level, and the external environment or interorganisational level. Organisational behaviour is the focus of the individual level, often described as the micro approach to organisations. The individual level focuses on individuals as the unit of analysis, exploring concepts such as motivation, leadership style and personality. The organisational level, following a macro approach, analyses the organisation as a whole, and is often concerned with organisational culture and organisation structure and design.

Daft (1983), explaining that organisation theory is not a collection of facts but a way of thinking about organisations, distinguishes two dimensional types for organisations, i.e. structural dimensions and contextual dimensions. The structural dimension is concerned with internal characteristics of organisation such as formalisation, specialisation, hierarchy of authority, centralisation, professionalism and personnel rations, while the contextual dimension characterises the whole organisation, including its size, technology, environment and goals (Daft, 1983). To understand and explore organisations, both structural and

contextual dimensions should be explored (Daft, 1983; Pugh, Hickson, Hinings, & Turner, 1968).

Early theories of the organisation, such as Taylor's (1923) scientific management theory, mainly focused on methods to improve productivity and provided little insight into the nature of the organisation. Traditional theories regarded the organisation as a closed system, isolated from the outside world and failed to take into account the many external influences in the organisation's environment. In the 1960s more modern theories of the organisation (Katz & Kahn, 1966; March & Simon, 1958; Selznick, 1957) started to explore the systems character of social relationships and the interaction of systems with their environment, embracing an open systems view of the organisation. For the purpose of this study, the open systems view of the organisation is next explored in more detail.

2.3.2 The organisation as an open system

A number of principles are considered common to all open systems, which include organisations (Katz & Kahn, 1966; Morgan, 2006). The first principle, *energy importation*, suggests that all open systems import energy in one form or another from its external environment. Where a closed system is isolated from its surrounding environment and does not engage in any exchanges with its environment, an open system has to engage and interact with its environment in order to maintain itself in existence (Jackson, 2003). Because the organisation is an open system, it cannot coordinate activities and resources without being dependent on other entities within its external environment, or without being influenced by changes in its external environment (Katz & Kahn, 1966; Pfeffer & Salancik, 1978). The implication is that an organisation must continuously import energy supplies in the form of people, material and knowledge from its external environment. The context of an organisation thus has a significant impact on its ability to survive and grow.

A second principle, *throughput* suggests that cycles of input, internal transformation, output and feedback are critical to sustaining the viability of an organisation. Where a closed system already contains all the inputs required to maintain itself, an open system can admit additional inputs from its environment (Skyttner, 2005). In an organisation the reorganisation of various inputs results in the creation of a new products or services. When the new product or service is exported to the external environment, it becomes an output. In contrast to closed systems, open systems thus can also return an output to its environment.

A third principle, *negative entropy*, advocates the reversal of the entropic process. The concept of entropy is derived from physics and refers to the universal law whereby all forms of organisation tend to move towards disorder and if left alone will eventually degenerate into an inert mass (Skyttner, 2005). In order for an organisation to be sustain itself, it therefore needs to develop the ability to import energy and transform inputs into outputs to offset the entropic tendencies (Morgan, 2006).

Negative entropy leads to a fourth principle of open systems, namely the ability to maintain a steady state or *dynamic homeostasis*. Essentially this is the ability of a system to preserve the character of the system throughout its growth and expansion. In adapting to the environment, organisations will attempt to include within their boundaries the external resources that are critical to their survival (Katz & Kahn, 1966), without changing the character of the organisation.

A fifth principle of open systems, *requisite variety*, suggests that a system can only adapt to its external environment if the system can command the same degree of variety as the external environment (Jackson, 2003). Considering the internal complexity of organisations, it thus means that organisations need to be able to reduce the variety of the environment or increase its own internal variety.

Differentiation, a sixth principle of open systems, means specialised parts perform specialised functions within complex systems (Skyttner, 2005). Organisations grow in an attempt to offset entropic processes, sometimes by expanding, and other times by creating new businesses or eliminating existing businesses. In the process specialisation and division of labour, or differentiation evolves (Burke, 2002).

Coordination and integration is a seventh principle of open systems. An open systems is always organised around a specific purpose, which means that systemic interaction must result in a goal or final state to be reached, or some equilibrium point being approached (Skyttner, 2005). In order to maintain a steady state or to achieve a goal, and to prevent too much differentiation taking place, a certain degree of integration through shared norms and values, and coordination of tasks and roles is required. Treating an organisation as a goal-seeking entity means that some members of the organisation might not necessarily know what the goal is, or even agree with the goal (Simon, 1964). Organisations therefore try to coordinate and induce human activity towards the organisation’s goal, highlighting the key role of motivational mechanisms in an organisation’s ability to survive and grow.

A final principle of open systems is *equifinality and multifinality*. Equifinality refers to the notion that open systems have equally valid alternative ways of attaining the same objectives from different initial conditions. This is also called convergence. Multifinality refers to the notion that from a given initial state, open systems can obtain different and mutually exclusive objectives, also called divergence (Hanson, 1995).

The open systems view of the organisation implies that the organisation is inevitably connected to the conditions of its environment. In order to ensure its continual survival and growth, an organisation therefore needs to be able to sense changes in both its internal and external environments, and adapt in an appropriate manner. This alignment with the environment implies an organisation must be able to learn, unlearn or relearn based on its past behaviours (Cyert & March, 1963; Fiol & Lyles, 1985; Levitt & March, 1988; Miller & Friesen, 1980). This view of the organisation as an adaptive system gave rise to the concept of organisational learning as a social phenomenon.

From the sociological perspective, most definitions thus conceive organisations as open social systems that coordinate human activity and resources within an environmental framework, in order to achieve certain objectives (Daft & Weick, 1984; Donaldson, 1995; Katz & Kahn, 1966; March & Simon, 1958; Scott, 1992; Selznick, 1957), ultimately to ensure its continual survival and growth.

As a goal-seeking entity, once specific organisational goals have been attained, organisations form new goals, implying an ultimate goal of continual survival and growth (March & Simon, 1958; Pfeffer, 1997).

Within the organisations-as-systems tradition, a number of theories developed, of which contingency theory is considered one of the most important. Contingency theory views organisations as consisting of a number of interacting subsystems, each with its own function to perform within the context of the organisation as a whole, and each function an imperative that has to be met if the organisation is to be viable (Jackson, 2000; Morgan, 2006). In general, the goal, human, technical, structural and managerial subsystems are considered critical in this regard. The contingency view of the organisation is summarised in Figure 2.11.

The goal or strategic subsystem is responsible for the overall purpose and objectives of the organisation, while the human or cultural subsystem is responsible for the people in the organisation, including their leadership and motivation. The technical subsystem is concerned

with the transformation of inputs, for example human, financial, information and material resources, entering the organisation into outputs such as products and services. The managerial subsystem is responsible for the other subsystems as well as the organisation's relationship with the environment (Jackson, 2000).

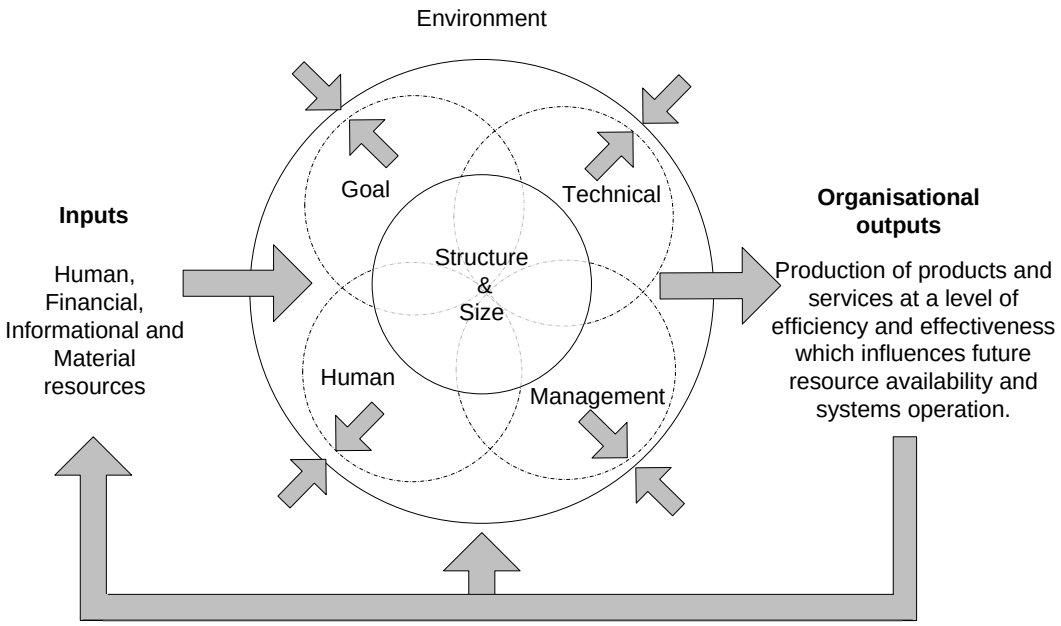


Figure 2.11: Contingency view of the organisation

Source: Adapted from Morgan (2006: 43) and Jackson (2000: 111)

A number of key ideas underlie the contingency view of the organisation. The contingency view is developed on the systems principle that organisations and their external environment are in a state of mutual influence and are interdependent. In order to adapt to environmental circumstances, and to maintain a steady state organisations thus need careful management. Contingency theory, however, proposes that there is no one best way to manage an organisation, but rather that it is the context that determines the most appropriate structure and actions. The role of management is therefore seen to be to consider the best fit of management given the context of the organisation. A further implication is that different management approaches may also be necessary for different tasks within the same organisation. To summarise, the contingency approach suggests that different types of organisations are needed in different contexts.

A key strength of an organisations-as-systems approach such as contingency theory, is that organisations are considered as a whole, looking at their subsystems, the interrelationships

between the subsystems as well as interaction with the environment (Jackson, 2000). Traditional organisation theories did not consider the interaction between an organisation and its environment. A number of criticisms can however also be levelled against the organisations-as-systems approach.

One of the criticisms is that the organisations-as-systems approach is more focused on survival than goal attainment, which can lead to the neglect of purposeful, goal-oriented activities within organisations (Jackson, 2000). Another key criticism is that within the organisations-as-systems perspective structures are seen as semi-permanent features which organisations strive to preserve. Structures are thus not viewed as temporary manifestations of processes (Jackson, 2000).

In order to address these shortcomings, an approach is needed that will allow for the identification of centres of control and command, measure performance against goals and focus more on the essential organisation of a system than prescribing a particular structure. A number of systems approaches, such as hard systems thinking (Checkland, 1981; Jenkins, 1972; Keys, 1991; Quade & Miser, 1985), systems dynamics (Forrester, 1958, 1971; Maani & Cavana, 2000; Senge, 1990; Vennix, 1996; Wolstenholme, 1990) and organisational cybernetics (Beer, 1972, 1979, 1984, 1994) were considered for their ability to assist organisational goal seeking and viability through increasing the efficiency and efficacy of organisational processes and structures.

Hard systems thinking is a generic term used to describe a number of systems approaches that can be used to solve real-world problems, comprising methodologies such as Operational Research, Systems Analysis and Systems Engineering (Jackson, 2003). Although hard systems thinking is a useful approach in assisting managers to achieve goals, it assumes the existence of a known desired state of a system and was therefore not considered an appropriate approach for the study. The research rather demanded an approach that would focus on improving organisational performance in terms of task performance and responding to changes in its environment.

Systems dynamics and organisational cybernetics supports this goal. Systems dynamics provides insight into the existing structure of complex systems and has proved to be a particularly useful approach to map organisational knowledge (Powell & Swart, 2005; Swart & Powell, 2006). This study’s emphasis on creating an appropriate context for knowledge

creation, use and sharing however required a focus on the essential organisation of systems, making organisational cybernetics a more suitable systems approach in this instance.

The next section continues to explore the organisation from a viable system perspective as an alternative organisations-as-systems approach.

2.3.3 The organisation as a viable system

One of the tenets of the systems perspective is the facilitation of goal seeking and viability. As explained in §2.3.2 system dynamics and organisational cybernetics assist organisational goal seeking and viability through increasing the efficiency and efficacy of organisational processes and structures. In systems dynamics, however, the relationships between feedback processes operating at a deep structural level, gives rise to system behaviour on the surface. With organisational cybernetics it is cybernetic principles at work at a deeper level that generate the phenomena observed at the surface, as well as the relationships between them (Jackson, 2003). For the purpose of the research, a systems approach was required that is underpinned by principles of viability and that could be used both in a diagnostic and a design mode. Beer's (1972, 1984) Viable System Model (henceforth VSM) affords this opportunity in that it can be used as an example of essential organisation against which existing processes and structures can be compared, as well as a starting point for designing organisations according to good cybernetic principles (Jackson, 2003) A viable systems approach thus provided the systems lens through which the research was approached.

The VSM defines a set of sub-systems as necessary and sufficient conditions for the viability of any human or social system, which includes organisations. The VSM further proposes that any deficiencies in the capacity or interaction of the sub-systems pose a threat to the viability of the organisation. Additionally the viability and cohesion of the organisation as a whole depend on the set of sub-systems operating recursively at all levels of the organisation.

For the VSM illustrated in Figure 2.12 to be used as a foundation for viewing the organisation as an open, viable system, it is important to understand the various sub-systems and the interaction between them. A brief overview of the VSM is provided next.

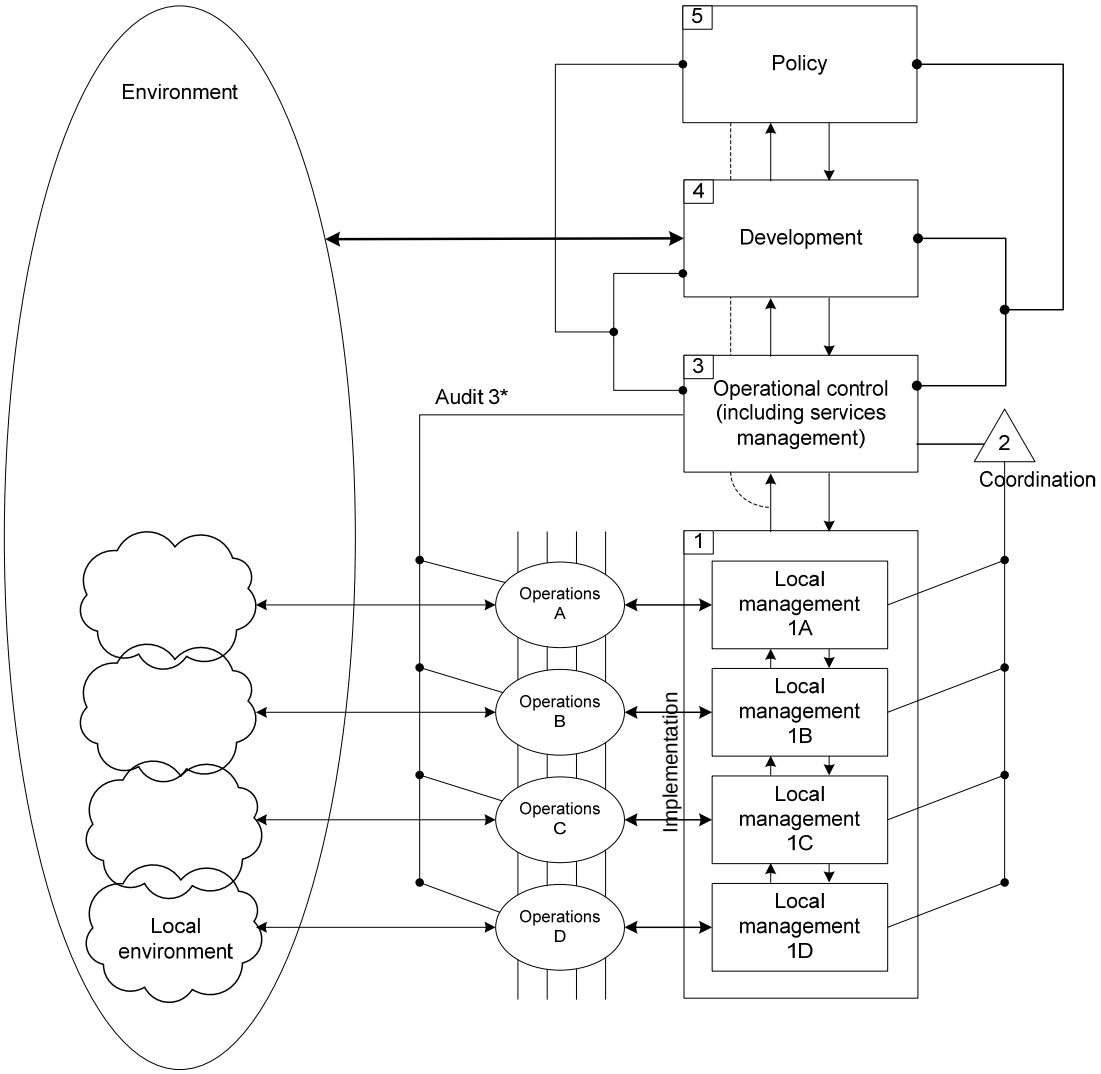


Figure 2.12: The Viable System Model (VSM)

Source: Jackson (2003: 92)

The first sub-system, called System 1, consist of the various parts of the organisation that are concerned with implementation, in other words the activities that are related to goals. An important characteristic of System 1 is that although it always is a viable system itself, it is required to continue to function as part of the whole organisation. Direction in terms of goals and objectives are received from System 5, which are refined into targets by System 3. System 1 is also subject to coordination by System 2, and audit by System 3*. Performance feedback is provided from System 1 to System 3. The role of Systems 2-5 is thus to be facilitative and they should not become viable systems in their own right.

The role of System 2 is the coordination of the various parts (1A, 1B, 1C, 1D) of System 1 to ensure they act in a cohesive manner mainly through communication and the provision of information. System 3 fulfils the role of operational control of System 1 as well as services management. It is responsible to govern the stability of the internal environment of the organisation and through System 3* (Audit) it has to ensure that policy is implemented appropriately. In other words, through its auditing role System 3* has to ensure that the regulations of System 2 and the targets specified by System 3 are complied to.

The VSM in other words pays attention to the sources of command and control in a system as well as measurement of performance against goals, the absence of which was considered a weakness of organisations-as-systems approaches.

Systems 1-3 perform the autonomic management function of the organisation within an established framework, but do not have a view of the organisation's overall environment and therefore do not have the capacity to respond to external threats and opportunities. The autonomic management function therefore does not have the capacity to explore and renew its competences or to achieve a sustainable competitive advantage.

The adaptive capability is provided by System 4 and 5. The role of System 4, development, is to consolidate all information about an organisation's internal and external environment, in order to facilitate decision making and alignment with changes in the environment. Based on the information received from System 4, System 5, policy, is then responsible for the formulation and communication of the direction, purpose and identity of the organisation as a whole. An in-depth discussion of the VSM is found in Beer (1972) and Jackson (2003).

Considering an organisation as a system then, the five sub-systems as conceived by the VSM must be present in order for the organisation to be considered a viable system. The VSM can be seen as integrating the findings of the organisations-as-systems view, and going beyond. The VSM does not prescribe a particular structure, but rather relates to the essential organisation of a system. Applying the principles of the VSM to the study therefore enables an organisations-as-systems approach to be followed, while addressing the elements of essential organisation without prescribing a particular structure.

The VSM is also considered to be applicable to various types of organisations, from small (Espejo, 1979), to large (Beer, 1979) organisations, to local and national government (Beer,

1994). This makes it particular useful in the study of a diverse group of knowledge-centric organisations.

2.4 Conclusion

This chapter established the philosophical foundations of the study by exploring two key concepts. The traditional theory of knowledge, or epistemology, was shown to be a largely individualist analysis of knowledge with no consensus on the source of knowledge and mostly focused on propositional knowledge. Polanyi's conception of knowledge as personal and context-specific was shown to address both propositional and practical knowledge, providing a solid foundation for a theory of organisational knowledge which is further explored in Chapter 3. This chapter also outlined the basic tenets of the organisations-as-systems view and the Viable Systems Model as the overarching approach followed in the study.

The next chapter lays reviews previous research, highlights existing gaps and explains how this study extends the existing research and address the identified gaps. Chapter 3 also presents a conceptual framework which integrates organisational knowledge theory and the viable systems model, building the theoretical foundation for the research.

CHAPTER 3
PREVIOUS RESEARCH

3.1 Introduction

Chapter 2 explored the philosophical foundations of the study, namely theories of knowledge and the organisation. Knowledge was shown to be personal, rooted in action and dependent on social interaction, while the organisation was shown to be an open, purposeful, adaptive system, in other words a dynamic system. These views of knowledge and the organisation provide the philosophical lens through which this study is approached, informing both the theoretical and empirical aspects of the research throughout the study. The purpose of Chapter 3 is to lay the theoretical foundation for the study, by reviewing previous research, highlighting existing gaps and explaining how this study extends the existing research and address the identified gaps. The theoretical lens is illustrated in Figure 3.1.

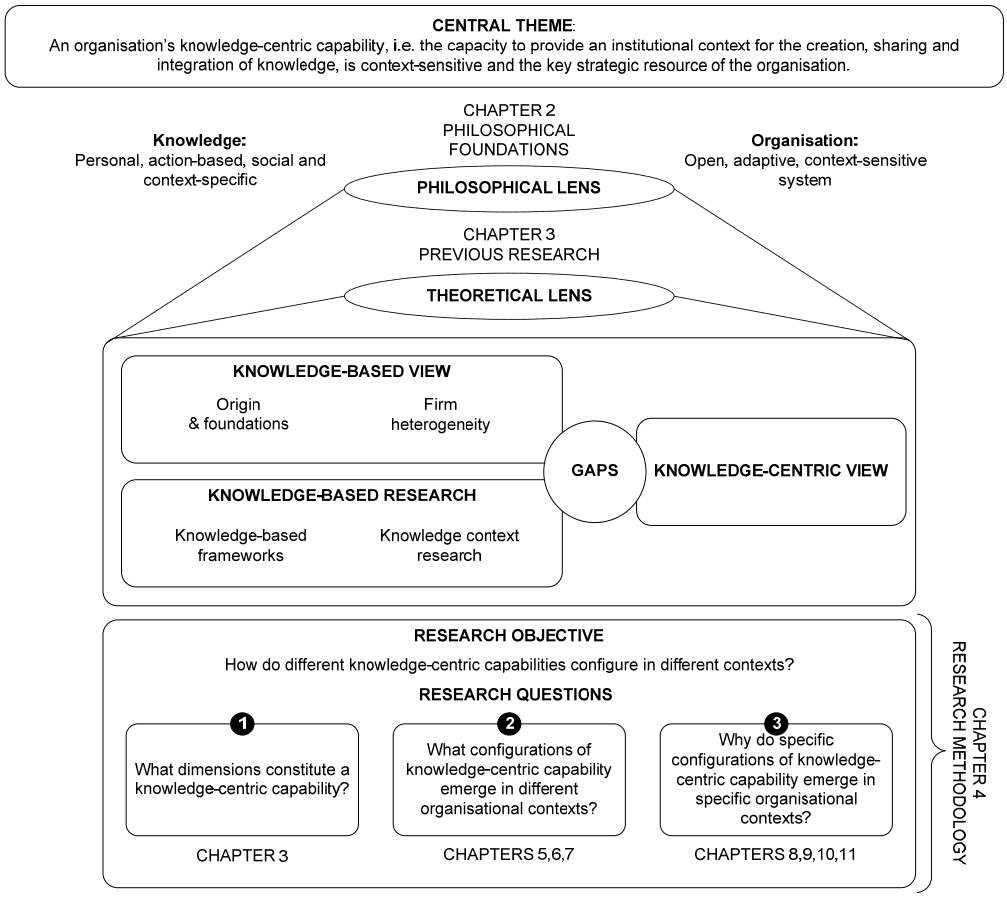


Figure 3.1: Theoretical lens of the study

The central premise of this study is that an organisation's knowledge-centric capability, i.e. its capacity to provide an institutional context for the creation, sharing and integration of knowledge, is a key strategic resource and therefore a basis for differentiation.

In a review of survey research in knowledge management, however, Chauvel and Despres (2002) observed little attempt to differentiate organisational types in a meaningful way. They found that the group of surveys overwhelmingly worked with a European and North American sampling base and no Asian, South American, African or Eastern European companies were specifically cited. Furthermore no cross-industry analysis was provided by the group of surveys. Chauvel and Despres (2002) states that this assumed homogeneity constitutes a deficiency in knowledge management survey research that should be redressed in future works. Their findings reflect the tendency in knowledge management literature to prescribe a tool, method, or way of thinking to a large range of companies or business problems, and that any differences in organisational form or circumstance and therefore organisational capability are simply unaccounted for.

The research objective of the study is therefore to understand how different knowledge-centric capabilities configure in different organisational contexts. Three supportive research questions are posed to address this issue. The first question explores which dimensions can be used to describe an organisation's knowledge-centric capability. The second question explores what configurations of knowledge-centric capabilities will emerge in different organisational contexts. The third research question explores why these configurations emerge, developing insight into how the dimensions of configurations are related within a specific context.

For the purpose of this study a resource is defined as "all assets, capabilities, organisational processes, firm attributes, information and knowledge controlled by the firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991). A capability in turn is defined as "a special type of resource, specifically and organisationally embedded nontransferable firm-specific resource whose purpose is to improve the productivity of the *other* resources processed by the firm" (Makadok, 2001). A capability thus refers to an organisation's capacity to deploy resources using organisational processes to achieve a desired outcome (Amit & Schoemaker, 1993).

The chapter now continues by positioning the study in the context of knowledge management. Next the chapter turns to review previous research within the knowledge-based

perspective, identifying gaps and highlighting the contribution of the study to the literature. Prescriptive knowledge management frameworks are shown to ignore the systems concept of equifinality. Descriptive knowledge management frameworks are shown to be largely oriented towards the traditional knowledge-based view, focusing on knowledge creation and neglecting organisational context and knowledge integration. Empirical knowledge management studies are shown to largely be focused on best practices, also ignoring the systems concept of equifinality or best fit. A number of studies are then presented that pursue best-fit approaches to knowledge management. The majority of these studies however focus on the nature of the relationship between the characteristics of knowledge used within an organisation, and certain organisational characteristics. None of the studies focuses on the capacity of an organisation to provide an institutional context for the creation, sharing and integration of knowledge, highlighting the contribution of the study in understanding the knowledge-centric capabilities of organisations.

The emphasis on organisational differences positions the study in the strategic management domain of the theory of the firm, where the central question is why firms are different. Focusing on firm heterogeneity affords the opportunity to explore how and why contextual differences can result in varying performance in terms of knowledge management. The knowledge-based view in particular is discussed, exploring its origins, assumptions about knowledge and treatment of firm heterogeneity. The traditional knowledge-based view of the firm is shown to misinterpret the nature of knowledge and to be lacking a sufficient dynamic view of the firm, focusing on distinct knowledge as a source of firm heterogeneity. Knowledge-centric capability is then presented as a more dynamic knowledge-based view, focusing on distinct knowledge-context creation capabilities as the source of firm heterogeneity in terms of knowledge management performance.

3.2 Positioning the study in the context of knowledge management

Since the earliest times knowledge has played a central role in the advancement of humankind and civilisation. Knowledge about discoveries made thousands of years ago, passed on through generations by means of storytelling, apprenticeships and in written form, has led to the rise of the modern industries we know today. Sharing know-how and exchanging ideas lead to the creation of new knowledge, and applying the new knowledge to common problems have resulted in countless innovations through past centuries.

In the past decade it became apparent that the industrial era had entered the end of its lifecycle. During this period technological advancements started to emerge that rapidly changed the way in which production was being organised, trade occurred and value was delivered to consumers (Greenspan, 1998). Although the fundamental rules of the economy have not changed, the structure and drivers of the economy have changed and knowledge is increasingly being recognised as a strategic resource. When managers consequently started to shift their attention from physical resources to the more intangible, which includes knowledge, the term knowledge management was coined to describe the emerging discipline of the conscious effort to examine and promote the sharing, use and creation of organisational knowledge in a formal manner.

Over the past 15 years knowledge management has emerged as a key new organisational practice with numerous organisations implementing processes aimed at facilitating knowledge creation, integration and sharing. During the same period a rapidly growing body of literature started to emerge on the subject with “The knowledge-creating company” (Nonaka & Takeuchi, 1995) probably the pioneering work on knowledge management in the academic field. The earliest peer reviewed journals focusing solely on knowledge management appeared only as recently as 1997. Knowledge management could therefore only be considered as an emerging management discipline, with the management practice and academic literature developing simultaneously (Foss & Mahnke, 2005). In the corporate world knowledge management was largely driven by consultancy companies as a result of the rapid adoption of information technology and the internet during the early 1990s. Consequently knowledge management mostly developed as a set of information technology-driven processes aimed at facilitating knowledge creation, sharing and storage. The early academic literature on knowledge management also followed this trend, and with no solid disciplinary foundations knowledge management is often considered a management fad (Foss & Mahnke, 2005).

With knowledge management being positioned as a strategic imperative, numerous studies have explored its resource-base and its management alternatives. These studies and frameworks have played an important role in establishing knowledge management as a field of inquiry within the business sciences and although useful, a number of weaknesses have limited the successful implementation of knowledge management. The chapter will show that most knowledge management frameworks present knowledge management best practices while failing to address contextual differences between organisations. The result is the all too

frequent failure of knowledge management initiatives, fuelling the fear that knowledge management is simply another passing fad.

The purpose of this study is therefore to explore how contextual differences between organisations contribute to knowledge management performance. Exploring knowledge management can be approached from various disciplines, such as sociology, strategic management and economics. The nature of the organisational problem being explored will determine which approach is deemed more appropriate. As discussed in §2.3.3 organisations are complex systems and to address the issues of knowledge, social interaction and organisation, a systems thinking approach is used to explore previous research in the knowledge-based view of the firm.

Theories of the firm typically address four issues (Foss, 1999; Grant, 1996b; Rumelt, 1984) namely the existence of the firm, the boundaries of the firm, internal organisation and competitive advantage, or firm heterogeneity, depicted in Figure 3.2.

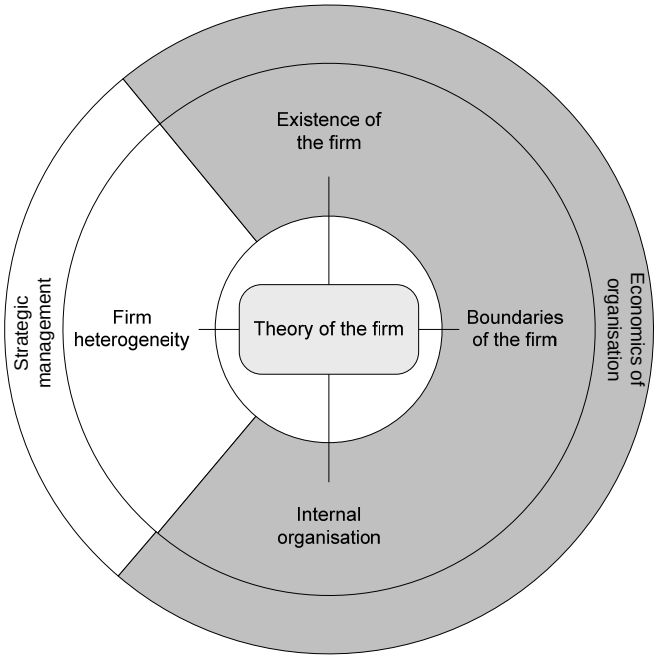


Figure 3.2: Key issues in a theory of the firm

The first three issues fall within the domain of modern economics of organisation, or organisational economics, while the fourth issue falls within the domain of strategic management. Viewing the organisation as an open, purposeful, adaptive system, this study addresses the question of why firms are heterogeneous from a knowledge-based perspective.

3.3 Gaps in previous research

3.3.1 Knowledge-based frameworks

A synthesis of the literature (APQC, 1996; Chauvel & Despres, 1999; Choo, 1998; Gallagher & Hazlett, 2000; Holsapple & Joshi, 2000; Klimko, 2001; Lee, Kim, & Yu, 2001; Leonard-Barton, 1995; Liebowitz, 1999a; Van der Spek & Spijkervet, 1997; Weerdmeester, Pocaterra, & Hefke, 2002) shows that knowledge-based frameworks can generally be grouped into prescriptive and descriptive frameworks, as listed in Table 3.1. Prescriptive frameworks tend to outline a methodology to follow for the implementation of knowledge management initiatives, while descriptive frameworks tend to depict knowledge management as a phenomenon or particular aspects of knowledge management.

Table 3.1: A synthesis of knowledge management frameworks

Framework	Type	Focus
APQC (1996) Organizational knowledge management model	Descriptive	Knowledge management processes (share, create, identify, collect, adapt, organise, apply) and knowledge management enablers (learderhip, culture, technology and measurement).
Chauval and Despres (1999) Knowledge management event chain	Descriptive	Key knowledge management events (mapping, acquire, capture, create, package, store, apply, share, transfer, reuse, innovate, evolve, transform).
Choo (1998) Model of the knowing organization	Descriptive	Use of information for knowledge creation through sensemaking, which includes information interpretation, knowledge creation, which includes information transformation, and decision making which includes information processesing.
Gallagher and Hazlett (2000) Knowledge management maturity model	Prescriptive	Stages of knowledge management maturity (k-aware, k-managed, k-enabled, k-optimised).
Holsapple and Joshi (2002) Three fold knowledge management framework	Descriptive	Managerial influences (leadership, coordination, control, measurement); resources influences (human, knowledge, financial, material); environmental influences (fashion, markets, competitors, technology, time, climate); activities (acquire, select, internalise, use); learning and projection as outcomes.
Klimko (2001) Knowledge management maturity model	Prescriptive	Stages of knowledge management maturity (initial, knowledge discoverer, knowledge creator, knowledge manager, knowledge renewer).
Lee, Kim and Yu (2001) Stage model for knowledge management	Prescriptive	Stages of organisational knowledge management development (initiation, propagation, integration, networking).
Leonard-Barton (1995) Core capabilities and knowledge building activities	Descriptive	Knowledge building activities (problem solving, implementing and integrating, experimenting, importing knowledge) and core capabilities (physical systems, managerial systems, employe skills and knowledge, values and norms).
Liebowitz (1999) Organisational intelligence	Descriptive	Knowledge cycle (transform information into knowledge, identify and verify knowledge, capture and secure knowledge, organise knowledge, retrieve and apply knowledge, combine knowledge, learn knowledge, create knowledge, distribute/sell knowledge).
Van der Spek and Spijkervet (1997) A framework of knowledge management	Descriptive	Cycle of knowledge management stages (conceptualise, reflect, act, retrospect) and internal and external developments that impact on stages.
Weerdmeester, Pocaterra and Hefke (2003) Knowledge management maturity model	Prescriptive	Knowledge management maturity levels (default, reactive, aware, convinced, sharing).
Wiig (1993) Pillars of knowledge management	Descriptive	Pillars of knowledge management (survey and categorise knowledge, analyse knowledge and related activities, elicit, codify and organise knowledge, appraise and evaluate value of knowledge, knowledge related actions, synthesize knowledge related activities, handle, use and control knowledge, leverage, distributed and automate knowledge).

Most prescriptive frameworks (Gallagher & Hazlett, 2000; Klimko, 2001; Lee, *et al.*, 2001; Levett & Guenov, 2000; Weerdmeester, *et al.*, 2002) follow a phased or life-cycle approach to knowledge management implementation and many take on the form of what is called maturity models. These maturity models are largely based on the Capability Maturity Model (Humphrey, 1989) that was developed from a software engineering perspective and prescribed processes that had to be in place in an organisation before a certain level of maturity in the practice of software engineering could be achieved. Similarly knowledge management maturity models prescribe different processes that need to be in place before a certain level of maturity in knowledge management can be achieved and before the organisation can proceed to the next level. These frameworks are used as tools to assess an organisation's current knowledge management capability and to provide a roadmap that will lead the organisation to the "ultimate" level where knowledge management is an optimised activity. A major point of criticism that can be levelled against this approach is the lack of consideration for organisational context. First these frameworks assume that the "ultimate" level of maturity as prescribed in the model will fit the context of the organisation, and second the assumption is made that only one path can lead to that ultimate level of knowledge management capability maturity. By doing so it ignores the concept of path dependency as discussed in §3.4.1 that explains how an organisation's past actions not only determine its current position, but also the future paths available to it. It also violates the systems thinking concept of equifinality.

The main focus of the descriptive frameworks (APQC, 1996; Choo, 1998; Holsapple & Joshi, 2002; Leonard-Barton, 1995; Liebowitz, 1999a; Van der Spek & Spijkervet, 1997) seem to be knowledge processes, while the organisation's role to create a suitable environment and context for individuals to create and develop personal knowledge is addressed to a lesser extent. Leonard-Barton (1995) identifies four core capabilities, namely physical systems, employee knowledge and skills, managerial systems and the organisation's values and norms. The APQC (1996) model of organisational knowledge management also identifies four knowledge management enablers, namely culture, leadership, measurement and technology. Holsapple and Joshi (2002) identify managerial, resource and environmental influences and Van der Spek and Spijkervet (1997) define these under internal developments as culture, employee motivation, organisational adjustments, management and technology.

None of these descriptive knowledge management frameworks however addresses organisational orientation towards knowledge. The descriptive frameworks therefore assume

that an organisation's knowledge orientation will fit the framework's knowledge orientation, also highlighting a lack of consideration for organisational context. Another criticism that can be levelled against some of the descriptive frameworks is its representation of knowledge processes as a cycle of processes, usually starting with knowledge creation, then moving on to some form of capturing the knowledge, or making it explicit, then organising the knowledge, sharing the knowledge and lastly using the knowledge. This conception of the knowledge cycle, views knowledge as an object that can be stored and manipulated, and to a large extent ignore the personal and social nature of knowledge as discussed in §2.2.5 and §2.2.6. One can also argue that this conception of the knowledge cycle have to a large extent contributed to the fact that so many organisation view knowledge management as an information technology initiative aimed at capturing and distributing knowledge using databases and other software tools.

Furthermore, identifying knowledge management best practices, benchmarks or influencing factors seem to be the goal of the majority of empirical studies in knowledge management (APQC, 2005; Chase, 1997; Choi & Lee, 2003; Darroch, 2003; Davenport, De Long, & Beers, 1998; De Long & Fahey, 2000; Gold, Malhotra, & Segars, 2001; Holsapple & Joshi, 2000; Khalifa & Liu, 2003; KPMG, 2003; López, Montes Peón, & Ordas, 2004; Lucas & Ogilvie, 2006; Martini & Pelligrini, 2005; O'Dell, Wiig, & Odem, 1999; Skyrme & Amidon, 1997; Sveiby & Simons, 2002; Viitala, 2004; Wong & Aspinwall, 2005).

These studies play an important role in developing a better understanding of the components of knowledge management and in some cases, the interaction between the components. A void however still remains in developing insight into the differences in context between organisations, and the implications of these differences in terms of choice of knowledge management approaches. This highlights the need for a best-fit or configurational approach to knowledge management.

3.3.2 Context-based approaches to knowledge management

The previous section has shown that a large number of the empirical studies discussed (Gallagher & Hazlett, 2000; Klimko, 2001; Lee, *et al.*, 2001; Levett & Guenov, 2000; Weerdmeester, *et al.*, 2002) neglect the concept of organisational context. Although some important works that consider different knowledge-based contexts have recently been published, for example Nonaka *et al.* (2008), configurational, or best-fit, studies however remain significantly fewer than the number of studies into knowledge-based best practices.

These studies are explored next using the knowledge management context dimension of Argote, McEvily and Reagans' (2003) theoretical framework for organising research on knowledge management. Typically research in to knowledge management contexts focusses on one or more of the sub-dimensions. Some studies focus on the properties of a particular unit which could be an organisation, a team within an organisation, an individual within an organisation or even a population or organisations. Studies can also focus on the relationships between units, in other words how the units are connected to each other and how specific dimensions of the relationship impact on knowledge management. Finally studies can focus on knowledge properties and how it affects knowledge creation or transfer.

Table 3.2 compares the context-based studies in terms of their knowledge management contexts.

A study by Bierly and Chakrabarti (1996) identifies four groups of firms with similar generic knowledge strategies by using cluster analysis. The study focuses on two of the knowledge management context sub-dimensions. It explores the properties of units by investigating the financial performance, R&D expenditures, and sales of companies in the U.S. pharmaceutical industry. It also explores the properties of knowledge by looking at external knowledge sources such as citation of patents in scientific journals and the breadth of the companies' knowledge bases.

The study makes a valuable contribution by indicating that certain knowledge strategies, namely Innovators and Explorers, can be linked to higher profits than knowledge strategies of Loners and Exploiters in the U.S. pharmaceutical industry. Although the study is rooted in the knowledge-based view of the firm, it views the primary role of the firm as the creation and application of knowledge. "Performance differences between firms are as a result of their different knowledge bases and differing capabilities in developing and deploying knowledge" (Bierly & Chakrabarti, 1996) . This view places the study within the knowledge-creating capability category of the knowledge-based view which, as described earlier in §3.3, does not provide insight into a firm's capability to create an environment that will facilitate the creation, integration and application of knowledge. More importantly, from a systems perspective, the study provides little insight into the relationships between the units.

Table 3.2: A synthesis of context-based studies

Study	Knowledge management context: Units	Relationships	Knowledge	Type	Focus	Gaps
Bierly and Chakrabarti (1996) Generic knowledge strategies in the U.S. pharmaceutical industry	X		X	Empirical: Cluster analysis	Generic knowledge strategies in U.S. pharmaceutical industry: Explorers, Exploiters, Loners, Innovators.	- Traditional knowledge-based view
Birkenshaw, Nobel and Ridderstrale (2002) Knowledge as a contingency variable: Do the characteristics of knowledge predict organization structure?	X	X	X	Empirical: OLS regression	Characteristics of knowledge in different types of R&D Units: Isolated, Opaque, Integrated, Transparent.	- Suggests optimum organisation structure (contingency approach)
Choi and Lee (2002) An empitical investigation of KM styles and their effect on corporate performance	X		X	Empirical: Cluster analysis	Knowledge management styles based on prevalent knowledge types: Passive, System-oriented, Human-oriented, Dynamic.	- Neglects interaction between environmental & organisational characteristics.
Earl (2001) Knowledge management strategies: toward a taxonomy	X			Multiple case studies	Taxonomy of knowledge management strategies or "schools" for knowledge management:Technocratic, Economic, Behavioural.	- Static view of KM; - Neglects concepts such as interaction with environment, learning and coordination.
Hansen, Nohria and Tierney (1999) What's you strategy for managing knowledge?	X		X	Multiple case studies	KM strategies: Codification or Personalisation.	- Only focus on dominance of tacit/explicit knowledge; - Neglects contribution to organisational ability.
Jordan and Jones (1997) Assessing your company's knowledge management style	X		X	Conceptual	Framework for describing dominant knowledge modes within an organisation.	- Fails to explore relationships between constructs.
Martini and Pellegrini (2005) Barriers and levers towards knowledge management configurations	X		X	Multiple case studies	Knowledge management configurations in Product Innovation: Codified, Network-based, Traditional.	- Only focus on knowledge-sharing capabilities.

A study by Birkinshaw, Nobel and Ridderstråle (2002) examined two dimensions of knowledge, namely observability and embeddedness, and their influence over the level of unit autonomy and inter-unit integration in an international network of R&D units. This places the study within all three categories of the knowledge management context framework. The study is however based on a contingency approach considering optimum organisation structure as dependent on knowledge as a contingency factor, as opposed to a configurational approach where superior performance is seen as a function of multiple interacting environmental and structural characteristics, rather than one primary contingency.

To the authors' own admission this proved to be a limitation to the study, which could be improved on if a configurational approach were to be followed: "…which suggests that as we think about further research in this area a configurational framing (rather than a pure contingency framing) may be more appropriate" (Birkinshaw, *et al.*, 2002: 284). In other words, from a systems perspective the study neglects the concept of equifinality.

A study by Choi and Lee (2003) explores the empirical relationship between knowledge management styles and corporate performance in a variety of industries, positioning it within the first and third categories of the knowledge management context framework. The measures of corporate performance represent the properties of units while measures of the degree of explicit- and tacit-orientation represent the properties of knowledge. The study thus also only focuses on knowledge as a contingent variable, while neglecting the interaction between environmental and organisational characteristics.

In a study of knowledge management strategies by Earl (2001) a typology of schools of knowledge management is presented based on attributes of different companies' knowledge management strategies, positioning it within the "properties of units" sub-dimension of the knowledge management context framework. Although the study provides a description of different types of knowledge management strategies, labelling them as ideal types, no insight is provided into why these strategies are deemed ideal types. While critical success factors are identified, no success measures are used in the analysis. From a systems perspective the study only touches on goal seeking, by identifying different knowledge management goals and some critical success factors. Concepts such as interaction with the environment, learning and coordination are neglected, resulting in a fairly static view of knowledge management.

Another study (Hansen, Nohria, & Tierney, 1999) uses multiple case studies to provide a rich description of different knowledge management strategies, positioning it in the "properties of

units" category of the knowledge management context framework. The knowledge strategies are differentiated based on the dominance of either explicit or tacit knowledge, which of course also positions it in the "properties of knowledge" category. This study however provides little insight into how these strategies contribute to an organisation's ability to perform.

Jordan and Jones (1997) developed a conceptual framework for describing the dominant knowledge mode within an organisation. Their exploration of the key dimensions of organisational knowledge positions their work in the "properties of units" and "properties of knowledge" categories of the knowledge management context framework. Their framework comprises organisational characteristics such as problem solving activities and knowledge processes, while the properties of knowledge as presented as tacit or explicit. The study however makes no attempt to explore relationships between any of the constructs. From a systems perspective the study therefore fail to address issues of emergence and coordination.

Another study (Martini & Pelligrini, 2005) discusses barriers and drivers to the selection of different knowledge management configurations in product innovation processes. The study identifies three knowledge management configurations, namely network-based, codification and traditional, based on the prevalence of different knowledge sharing mechanisms in organisations.

The study therefore focuses on properties of units and properties of knowledge, while the relationships between units are neglected. The study does not provide insight into knowledge-centric capabilities of organisations, only their knowledge-sharing capabilities.

The synthesis of context-based studies, presented in Table 3.2 highlights the tendency to focus on characteristics of units and characteristics of knowledge, while ignoring the relationship between units. It also shows that as far as the characteristics of knowledge are concerned, all the studies focus on the distinction between explicit and tacit knowledge, while neglecting aspects such as the role, origin and boundaries of knowledge. None of the studies explores the empirical relationship between knowledge-centric capabilities and knowledge management performance, highlighting the need for further research in this area. The next section positions the research questions in relation to the identified gaps in previous research and highlights the contribution of the study to the extant literature.

3.4 The knowledge-based view

3.4.1 Origin and foundations

The knowledge-based view of the firm is a relatively new perspective within the field of strategic management. Where Porter's (1980) competitive forces approach to strategic management emphasises the actions an organisation can take to create defendable positions against competitive forces, the knowledge-based perspective views an organisation's knowledge as its most strategic resource. For this reason it is considered to be an extension of the resource-based view (Coff, 2003; Conner & Prahalad, 1996; Curado & Bontis, 2006; De Carolis, 2002; Grant, 1996b; Kogut & Zander, 1992; Spender, 1996b; Von Krogh & Grand, 2002).

The resource-based view emerged as a theory to understand why organisations are different, viewing a collection of internal resources and their use in achieving a sustainable competitive advantage as a differentiating factor (Barney, 1991; Nelson, 1991; Peteraf, 1993; Wernerfelt, 1984). The basic premise of the resource-based view is thus that organisations use resources to create and maintain their competitive advantage. Generally a resource must comply with at least four conditions to be considered a strategic resource capable of rendering a sustainable competitive advantage (Amit & Schoemaker, 1993; Barney, 1991; Collis & Montgomery, 1995; Mahoney, 1995; Peteraf, 1993; Wernerfelt, 1984; Williams, 1992). For knowledge to be viewed as a strategic resource, as put forward in the knowledge-based view, it can thus be expected to comply with the same conditions.

The first condition put forward in the resource-based view is that the resource must be valuable, enabling strategies that improve the organisation's efficiency and effectiveness. The resource therefore must enable the organisation to exploit opportunities or neutralise threats in its environment. Knowledge can be used to improve products, processes, technologies or services that will enable an organisation to remain competitive and viable. Being the first to acquire new knowledge can also assist an organisation to attain a valuable strategic advantage. From a knowledge-based perspective knowledge can therefore be viewed as a valuable resource.

The second condition posits that a resource must be rare and heterogeneous, in other words it should be specific to the organisation and not common to existing and potential competitors. Organisational knowledge is dependent on the knowledge and experiences of current and past

employees, and is built on specific organisational prior knowledge. From a knowledge-based perspective knowledge can thus also be considered rare and heterogeneous.

The third condition is that a resource must be imperfectly imitable or imperfectly mobile. This means the resources cannot be obtained by competitors, partly because an organisation's ability to accumulate specific resources is contingent on its unique historical decisions and actions (Barney, 1991; Dierickx & Cool, 1989), and because the resources are specialised to the organisation's specific needs (Peteraf, 1993). At first glance knowledge meets this requirement because knowledge is context specific, as discussed in §2.2.5. Explicit knowledge can however easily be transferred and applied in a different context, which implies additional mechanisms that protect organisational knowledge from imitation are a precondition for strategic assets. Conversely, the very nature of tacit knowledge, being personal and inexpressible, means it is inimitable because each individual in an organisation contributes knowledge based on personal interpretation of information. In addition, organisational knowledge is built on the unique past history of the organisation's own experiences and accumulated experience and therefore no two groups or organisations can think or function in identical ways. In other words, the more an organisation is oriented towards tacit knowledge, the harder it will be for competitors to imitate. It is however also true that tacit knowledge will also be difficult to replicate internally, unless mechanisms are put in place to facilitate learning (Teece, Pisano, & Shuen, 1997) and integrate knowledge. A distinctive learning environment is in other words a further condition that should be tied to the inimitability condition for knowledge to be considered a strategic resource.

The fourth condition is that it must be difficult for the competition to substitute the resource with a strategic equivalent that enables the implementation of similar strategies. Resources that meet this condition might render a temporary competitive advantage, but it is unclear how this condition can render a sustainable competitive advantage in a dynamic environment. This condition highlights a conflict between the resource-based and a systems perspective. The resource-based view is not compatible with the conception of the organisation as an open, adaptive system. This sentiment is supported by the view of other scholars (Eisenhardt & Martin, 2000; Foss, 1998; Priem & Butler, 2001) that the resource-based view does not convincingly explain sustained competitive advantage in a dynamic environment. In other words how do organisations employ resources to create, maintain and renew their competitive advantage in a dynamic environment? If the organisation is to be viewed as an open, adaptive system, a knowledge-based perspective therefore needs to address the issue of

how organisations employ knowledge to create, maintain and renew their competitive advantage in a dynamic environment.

As was shown above, despite the significant contribution of the resource-based view to research, particularly in the field of strategic management, a number of criticisms can be levelled at it. Some scholars (Porter, 1991; Priem & Butler, 2001) have argued that the resource-based view is circular and that it lacks a theory of the environment, or that various contributions to the resource-based view have little in common other than the shared emphasis on resources (Foss, 1998). The most important criticism is however the rather static view of the organisation.

The dynamic capability view developed in response to this inadequacy in the resource-based view, and builds on it by conceptualising the resource-based approach in a dynamic context. This dynamic approach is partly based on the work of Schumpeter (1934), Penrose (1959) and Nelson and Winter (1982) and is focussed on the ability of an organisation to modify and renew its resource base by creating, integrating, recombining and releasing its resources in order to adapt to current changes or to effect change in its environment (Eisenhardt & Martin, 2000). From a dynamic knowledge-based perspective this means focusing on the ability of an organisation to modify and renew its knowledge base by creating, integrating, recombining and releasing its knowledge resources in order to adapt to current changes or to effect change in its environment. The evolutionary view of competitive advantage is discussed under various names in the literature, for example core competencies (Prahalad & Hamel, 1990), capacity for regeneration (Ambrosini, Bowman, & Collier, 2009; Hogarth, Michaud, Doz, & Van der Heyden, 1991), competence-based competition (Hamel & Heene, 1994), combinative capabilities (Kogut & Zander, 1992), and dynamic capabilities (Teece, 2007; Teece & Pisano, 1994; Teece, *et al.*, 1997). From these perspectives a sustainable competitive advantage is dependent not only on the ownership of distinctive resources, but also distinctive and dynamic capabilities.

The concept of dynamic capabilities was originally defined as “the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments” (Teece, *et al.*, 1997: 516). In this definition competencies included managerial and organisational processes, in turn comprising coordination or integration, learning and reconfiguration (Teece, *et al.*, 1997).

From an organisational economics perspective, organisations aim to coordinate activities better than market or inter-organisation relations can (Coase, 1937; Foss & Christensen, 2001). The competence of an organisation has been shown to be embedded in its distinct ways of coordinating and integrating activities (Faraj & Sproull, 2000; Garvin, 1998; Iansiti & Clark, 1994). The role of the organisation is therefore to provide an environment that integrates individual effort, activities, learning processes and strategies in a coherent manner (Foss & Christensen, 2001). Additionally, organisational processes display varying degrees of coherence and Teece *et al.* (1997) explain that recognising congruence and complementarities among processes, and between processes and incentives is key to understanding the capabilities of an organisation. Corporate coherence then is the ability of an organisation to generate and exploit synergies of various types (Foss & Christensen, 2001; Teece, Rumelt, Dosi, & Winter, 1994).

Also important in Teece *et al.* (1997) and other (Eisenhardt & Martin, 2000; Zollo & Winter, 2002) conceptions of dynamic capabilities, is the notion that dynamic capabilities emerge from organisational learning. To a large extent the various authors draw on Levitt and March's (1988) discussion of organisational learning as routine-based, history-dependent and target oriented. Learning is seen as a social and collective process that occurs both through imitation or emulation, and through developing collective understandings or interpretations of history and complex problems (Levitt & March, 1988; Teece, *et al.*, 1997). The resulting organisational knowledge is then absorbed into routines, that becomes the collective organisational memory and guides future behaviour (Levitt & March, 1988).

Another important aspect of organisational learning in the context of dynamic capabilities is its role in solving the evolutionary economic problem of creating variety. This is accomplished through the reconfiguration of organisational resources in order to accomplish the required internal and external transformation to align with changes in the environment (Teece, *et al.*, 1997). A simulation study by Marengo (1994) has demonstrated how new organisational knowledge emerges from the interaction of coordinated learning processes within organisations. The study also highlighted an apparent tension between the necessity to keep the organisation together and to allow for diversity of experimentation. This observation concurs with March's (1991) observation of a trade-off between the exploitation of old certainties and the exploration of new possibilities, with an emphasis on improved competence in the exploitation of existing knowledge rendering the exploration of new knowledge less attractive, and the exploration of new knowledge reducing the speed at which

existing skills are improved. “Maintaining an appropriate balance between exploration and exploitation is a primary factor in system survival and prosperity” (March, 1991: 71).

Organisational learning is also cumulative and path-dependent, which means that new capabilities can only be developed on existing capabilities (Dierickx & Cool, 1989). The notion of path dependency recognises that an organisation’s current position and path ahead is shaped and constrained by previous activities and learning (Teece, *et al.*, 1997). It is however not only learning processes and the coherence of processes that determine an organisation’s position, but also its specific resources, as argued in the resource-based view.

Furthermore, dynamic capabilities and competences can only provide a competitive advantage if the routines, skills and resources they are based on are distinctive, meaning they should be difficult to imitate (Dierickx & Cool, 1989; Teece, *et al.*, 1997). Factors like the tacit nature of knowledge, unobservable processes, or intellectual property protection could act as barriers to the imitation of competences (Teece, *et al.*, 1997).

Finally, dynamic capabilities can exist at different levels in relation to managerial perceptions of the environment, namely incremental, renewing and regenerative dynamic capabilities (Ambrosini, *et al.*, 2009). Where incremental dynamic capabilities are concerned with continuing improving an organisation’s resource base, renewing dynamic capabilities are concerned with refreshing, adapting and augmenting the resource base. Regenerative dynamic capabilities change the manner by which an organisation changes its resources base, therefore impacting on an organisation’s current collection of dynamic capabilities (Ambrosini, *et al.*, 2009).

From a dynamic knowledge-based perspective then, a sustainable competitive advantage cannot solely be achieved through the ownership of distinctive knowledge. Additional to a unique knowledge base, distinctive and dynamic capabilities are required in providing an organisational context for creating, transferring and integrating such knowledge. For the purpose of this study, this concept is referred to as an organisation’s knowledge-centric capability. Over the past decade scholars have quite extensively elaborated on the initial idea of dynamic capabilities, diffusing rather than consolidating the meaning of dynamic capabilities as a concept. In an attempt to provide a more precise definition of dynamic capabilities that can serve as a basis for future work, Helfat *et al.* (2007: 4) defines a dynamic capability as “the capacity of an organisation to purposefully create, extend or modify its

resource base". This definition has been adopted in the study to form the basis of the conception of the knowledge-centric capability.

3.5 Research questions

Chauvel and Despres' (2002) reflect that the tendency in knowledge management literature to prescribe a tool, method, or way of thinking to a large range of companies or business problems, constitutes a deficiency in knowledge management research, because any differences in organisational form or circumstance and therefore organisational capability are simply unaccounted for. The study aims to address this deficiency by proposing that an organisation's knowledge-centric capability, i.e. its capacity to provide an institutional context for the creation, sharing and integration of knowledge, is a key strategic resource and therefore a basis for differentiation. The research objective of the study is to understand how different knowledge-centric capabilities configure in different organisational contexts. Three supportive research questions, illustrated in Figure 3.3, are posed to address this issue.

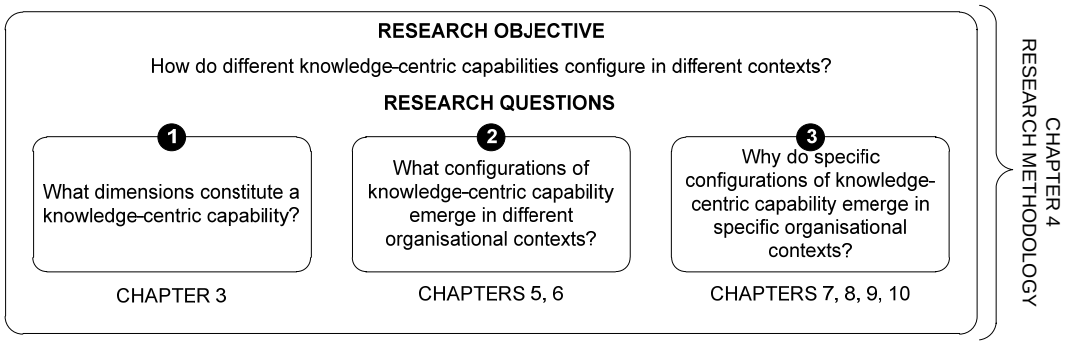


Figure 3.3: Research questions

The first research question explores which dimensions can be used to describe an organisation's knowledge-centric capability and is addressed in §3.6. The first question explores the characteristics of not only the intent to create a knowledge-centric environment and the enactment of the intent, but also the orientation towards knowledge. In doing so the first research question addresses both the properties of units and the properties of knowledge as depicted in Table 3.3.

The second research question explores what configurations of knowledge-centric capabilities will emerge in different organisational contexts, and is addressed in chapters 5 and 6. The third research question explores why these configurations emerge, developing insight into how the dimensions of configurations are related within a specific context, and is addressed in chapters 7, 8, 9 and 10.

Table 3.3: Addressing the identified research gaps

Study	Knowledge management context: Units	Relationship	Knowledge	Focus	Gaps	Addressed in this study
Bierly and Chakrabarti (1996) Generic knowledge strategies in the U.S. pharmaceutical industry	X		X	Generic knowledge strategies in U.S. pharmaceutical industry: Explorers, Exploiters, Loners, Innovators.	- Traditional knowledge-based view	- Knowledge-centric view
Birkenshaw, Nobel and Ridderstrale (2002) Knowledge as a contingency variable: Do the characteristics of knowledge predict organization structure?	X	X	X	Characteristics of knowledge in different types of R&D Units: Isolated, Opaque, Integrated, Transparent.	- Suggests optimum organisation structure (contingency approach)	- Configurational approach
Choi and Lee (2002) An empitical investigation of KM styles and their effect on corporate performance	X		X	Knowledge management styles based on prevalent knowledge types: Passive, System-oriented, Human-oriented, Dynamic.	- Neglects interaction between environmental & organisational characteristics.	- Addresses interaction between environment and organisation
Earl (2001) Knowledge management strategies: toward a taxonomy	X			Taxonomy of knowledge management strategies or "schools" for knowledge management:Technocratic, Economic, Behavioural.	- Static view of KM; - Neglects concepts such as interaction with environment, learning and coordination.	- Based on dynamic capabilities view; - Addresses interaction with environment, learning and coordination.
Hansen, Nohria and Tierney (1999) What's you strategy for managing knowledge?	X		X	KM strategies: Codification or Personalisation.	- Only focus on dominance of tacit/explicit knowledge; - Neglects contribution to organisational ability.	- Focus on type, role, boundaries and source of knowledge; - Focus on orgnanisational capability.
Jordan and Jones (1997) Assessing your company's knowledge management style	X		X	Framework for describing dominant knowledge modes within an organisation.	- Fails to explore relationships between constructs.	- Explores relationships between dimensions and sub-dimensions of knoweldge-centric capability.
Martini and Pellegrini (2005) Barriers and levers towards knowledge management configurations	X		X	Knowledge management configurations in Product Innovation: Codified, Network-based, Traditional.	- Only focus on knowledge-sharing capabilities.	- Focus on three dimensions of knowledge-centric capabilty, i.e. Intent, Orientation and Enactment.
	Question 1	Questions 2 & 3	Question 1			

Research questions 2 and 3 are thus concerned with what relationships emerge between the various dimensions of a knowledge-centric capability and why the relationships emerge, both addressing the properties of relationships as depicted in Table 3.3.

The study also addresses the identified gaps in the literature in a number of ways. A review of the literature has shown that knowledge management as a business practice often is misinformed by the knowledge-based view's general lack of understanding of the nature of knowledge. This misconception results in a misinterpretation of the role of the organisation in knowledge management as that of knowledge-creation, as in the case of Bierly and Chakrabarti (1996).

This study aim to address the misconception by arguing that the role of the organisation is rather to develop a knowledge-centric capability by creating a proper organisational context for facilitating activities and learning at the group level, and knowledge creation and accumulation at the individual level.

Rather than suggesting an optimum organisation structure, as in the case of Birkenshaw, Nobel and Ridderstrale (2002), the study uses a configurational approach which supports the principle of equifinality. Where studies like Choi and Lee (2003) and Earl (2001) fail to address the interaction between the environment and organisational characteristics, the study follows a context-sensitive approach based on the dynamic capabilities view and the interaction between the environment and the organisation.

Furthermore, where studies such as Hansen, Nohria and Tierney (1999) focus solely on the tacit and explicit characteristics of knowledge, the study explores the orientation towards knowledge from multiple perspectives, i.e. type, role, boundaries and source.

Finally, where a number of studies fail to explore the relationships between constructs, for example Jordan and Jones (1997), or only focus on a single dimension of knowledge capabilities, such as Martini and Pelligrini (2005), this study explores multiple dimensions of a knowledge-centric capability.

3.6 Knowledge-centric capability as basis of firm heterogeneity

3.6.1 Introduction

In this section, the first research question, namely what dimensions constitute a knowledge-centric capability is addressed. The key concepts in Helfat *et al.*'s (2007) definition are of

great significance to the conception of the term “knowledge-centric capability”, which refers to an organisation’s ability to provide an organisational context for creating, transferring and integrating knowledge. The dimensions of a knowledge-centric capability are presented in Figure 3.4.

First the term “purposefully” refers to some degree of intent as opposed to routine organisational activities. In the conception of knowledge-centric capability this is identified as organisational intent, which is discussed in §3.6.2.

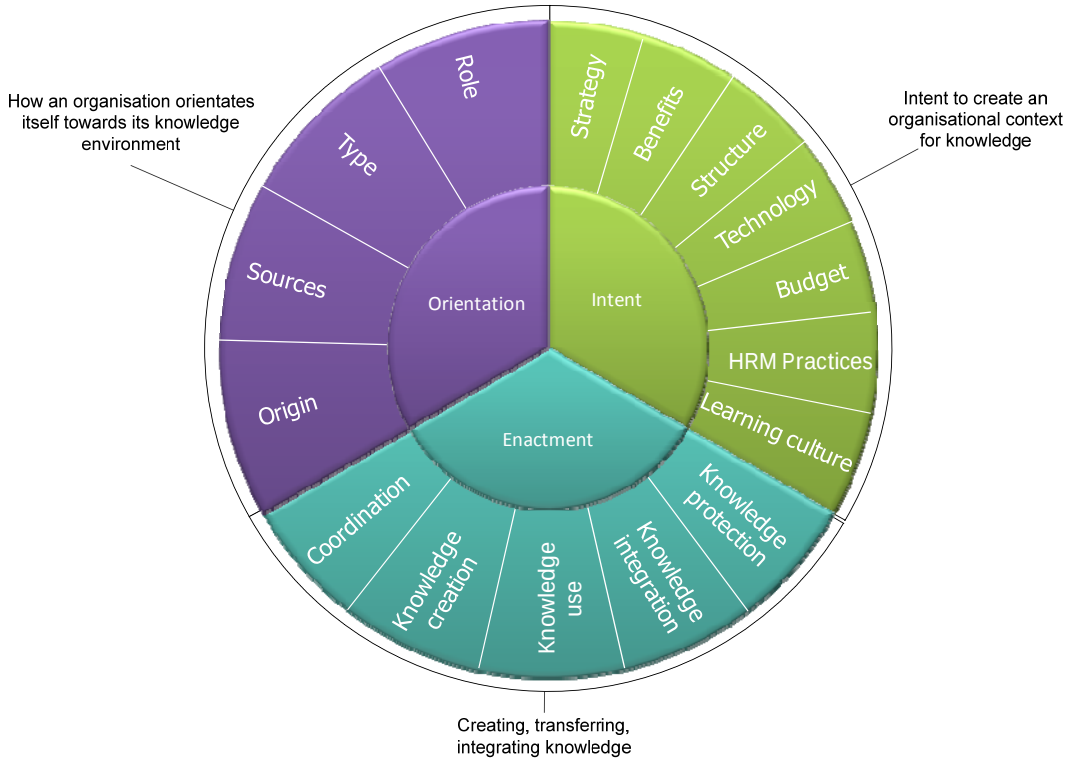


Figure 3.4: Dimensions of a knowledge-centric capability

In the concept of knowledge-centric capability, “resource base” refers to the knowledge base of the organisation. An organisation’s orientation towards its knowledge resources will therefore have great bearing on its capability to leverage those resources. From a knowledge-centric capability perspective this is referred to as an organisation’s knowledge orientation, which is discussed in §3.6.3.

The phrase “create, extend or modify” refers to the actions undertaken by an organisation to modify its resource base, which in the conception of knowledge-centric capability is referred to as “enactment”, as discussed in §3.6.4.

Also of great importance is the notion that “capacity” refers to the ability or potential to perform a task adequately. It does not necessarily refer to superior performance. “Capacity” also implies that the dynamic capability can reliably be repeated and that it is not merely a once-off activity or luck (Helfat, *et al.*, 2007). In terms of the concept of knowledge-centric capability, the term “capability” therefore refers to the ability to adequately provide an organisational context for creating, transferring and integrating knowledge. It does not assume that one type of knowledge-centric capability is superior to another.

In §2.3.3 the organisation was examined as a viable system and the VSM was identified as an appropriate model to address issues of essential organisation within a system, without prescribing a particular structure. It therefore seems that the VSM can be applied to the knowledge-centric capability concept to establish the essential structural elements or organisation that is required for the knowledge-centric task to be performed “adequately” in the terminology of dynamic capabilities. In §3.6.5 the VSM is mapped to the knowledge-centric capability framework, forming the basis for investigating the ability of an organisation to purposefully create an environmental context to create, transfer and integrate knowledge in terms of its adequacy.

3.6.2 Organisational intent

Perceiving organisations as goal-seeking entities, means that capabilities are always tied to an intention and an outcome. “To be capable of something is to have a generally reliable capacity to bring that thing about as result of an intended action” (Dosi, Nelson, & Winter, 2000: 2). The intent should therefore also be reflected in the activities of the organisation which are aimed at facilitating the desired outcome. With a knowledge-centric capability this is reflected in the intent to provide an environment that is conducive to the creation, integration and application of knowledge as a strategic resource. Reviewing relevant research in the knowledge-based view (Alavi & Leidner, 2001; Argote, *et al.*, 2003; Davenport, *et al.*, 1998; De Long & Fahey, 2000; Fiol & Lyles, 1985; Gold, *et al.*, 2001; Holsapple & Joshi, 2000; Khalifa & Liu, 2003; Leonard-Barton, 1995; Liebowitz, 1999b; Lucas & Ogilvie, 2006; Ribière & Sitar, 2003; Skyrme & Amidon, 1997; Wong & Aspinwall, 2005; Zack,

1999a, 1999b) highlights a number of activities as critical in an organisation's quest to create such an environment.

A formal, clearly articulated knowledge management strategy is considered a key factor to effective knowledge management (Davenport, *et al.*, 1998; Khalifa & Liu, 2003; Liebowitz, 1999b; Skyrme & Amidon, 1997; Wong & Aspinwall, 2005; Zack, 1999a) and is probably the most explicit indicator of an organisation's intent to manage knowledge as a strategic resource. It provides direction and purpose and should be linked to an organisation's business strategy to promote coherence between the objectives of knowledge management and an organisation's strategic goals (Hansen, *et al.*, 1999; Harrigan, 1985; Khalifa & Liu, 2003; Skyrme & Amidon, 1997). A knowledge management strategy guides an organisation in identifying knowledge management initiatives that will strengthen its competitive position (Zack, 1999a). It also guides an organisation in developing the infrastructure capabilities necessary to manage knowledge as a strategic resource.

Linking knowledge management activities to some form of economic performance of industry value is also considered a key factor in the success of knowledge management initiatives (Davenport, *et al.*, 1998). Such benefits are not necessarily of a financial nature, and often include better decision making, better response times, increased innovation, increased market share, increased productivity, enhanced employee skills, reduced cost or improved profits (KPMG, 2000; Ribière, 2001).

Knowledge leadership in the form of a knowledge champion with top management support is often cited as a key success factor for knowledge management initiatives (Davenport, *et al.*, 1998; Holsapple & Joshi, 2000; Liebowitz, 1999b; Ribière & Sitar, 2003; Skyrme & Amidon, 1997). The allowance for such a knowledge leadership role in the organisational structure is therefore considered an indicator of the intent to provide an environment conducive to the creation and sharing of knowledge. This not only includes the role of a knowledge management champion at a senior level in the organisation, but also a knowledge management function, designated roles within the business units (APQC, 2005) and a person, team or function dedicated to research (Edler, 1999). Organisations that conduct their own research are also considered to be better able to exploit external knowledge sources (Cohen & Levinthal, 1990). The presence of a formal research function therefore is also an indication of intent to create a knowledge-centric environment.

While knowledge management is often incorrectly seen as purely an information technology application, it doesn't mean that information systems have no role to play in knowledge management. Organisational knowledge management and its underlying processes can be enhanced and supported through a well-developed technical infrastructure (Alavi & Leidner, 2001; Alavi & Tiwana, 2003; Davenport, *et al.*, 1998; Liebowitz, 1999b; Skyrme & Amidon, 1997; Zack, 1999b). Information and communication systems can assist with the integration of fragmented flows of knowledge (Gold, *et al.*, 2001; Teece, 1998). Having a technical infrastructure is however not a sufficient indicator of intent. The alignment of the technology with the knowledge management strategy is of great importance (KPMG, 2000), as is monitoring the use and effectiveness of the supporting technologies and providing training to the users of the technology (APQC, 2005).

Growth in the resources attached to knowledge management, which includes financial resources, is considered an indicator of the effectiveness of a knowledge management initiative (Davenport, *et al.*, 1998). The availability of financial resources may affect the efficiency and quality of knowledge activities, and also the execution of leadership, coordination, control and measurement (Holsapple & Joshi, 2000). Therefore the availability of a dedicated budget for knowledge management activities and an anticipated growth in knowledge management activities' share of the overall budget could be used as an indicator of the intent to create an environment conducive to knowledge creation and sharing (Edler, 1999).

Organisations aim to achieve continual survival and growth by coordinating human activity and resources, and by providing incentives to members of the organisation in exchange for their contribution towards the organisation's goal. Members of an organisation will only continue to volunteer their contributions to an organisation as long as the incentive for doing so is adequate in terms of their own personal goals (March & Simon, 1958; Pfeffer, 1997).

The potential conflict between the goals of the organisation and the goals of individual members is addressed in organisational economics as agency theory or the principal-agent problem. Agency theory explores how various aspects of internal organisation may be explained as efficient response to various principle-agent problems, and largely focus on differences between input and output-based compensation, the impact of the observability of effort, the role of monitoring and subjective and objective performance measurement (Foss & Mahnke, 2005). Rewards and incentives are therefore considered important components of

the knowledge management process (Argote, *et al.*, 2003; Davenport, *et al.*, 1998; Liebowitz, 1999b; Lucas & Ogilvie, 2006; Skyrme & Amidon, 1997) and should be aligned to an organisation's knowledge management objectives. Incentives act as mechanisms to motivate employees to participate in the knowledge processes that are considered important by an organisation. The deployment of monetary or non-monetary incentives as mechanisms to encourage the creation, sharing and use of knowledge is therefore considered as an indicator of an organisation's intent to create a suitable environment for such activities. Another important indicator is the relative importance of individual performance and collective performance in the performance measurement process.

The experimentation processes an organisation deliberately puts in place to enable the identification of new opportunities and quicker and better execution of tasks (Teece, *et al.*, 1997) is another indicator of intent. Variety creation, or the emergence of novelty, is central to the creation of new knowledge (Foss & Christensen, 2001). Specific organisational practices aimed at skill development and mentoring lead to the development of such capabilities (Orlikowski, 2002). In fact, the culture in an organisation is considered central to its ability to learn and to use knowledge as a source of competitive advantage (Davenport, *et al.*, 1998; De Long & Fahey, 2000; Fiol & Lyles, 1985; Gold, *et al.*, 2001; Leonard-Barton, 1995). Learning processes also contribute to the development of dynamic capabilities (Easterby-Smith & Prieto, 2008). The prevalence of activities aimed at creating a learning culture is therefore considered an indicator of an organisation's intent to create, share and use knowledge as a strategic resource. Typical activities include formal training, formal mentoring practices, collaboration with external experts, formal interaction with internal experts, encouragement to explore and experiment, and encouraging an open and trusting communication between employees (Edler, 1999).

3.6.3 Knowledge orientation

The way in which an organisation orientates itself towards its knowledge environment will have a profound impact on the way in which knowledge is used as a resource for creating a competitive advantage.

Adapting the four-stage framework developed by Hogarth, *et al.* (1991) could prove useful in exploring the role of knowledge in an organisation. The framework was developed for analysing the activities of organisations with a view to understand how this impacts long term

viability. Hogarth *et al.* (1991) contend that an organisation's long term viability may be understood in terms of four stages, as presented in Table 3.4.

Table 3.4: Key features of the four stages

Stage 1	Privileged access	Rents only from ownership of privileged access
Stage 2	Transformation	No capacity for changing processes or routines
Stage 3	Leverage	Capacity for changing processes or routines
Stage 4	Regeneration	Capacity for changing processes or routines and means of changing ways for changing processes or routines

Source: Hogarth, *et al.*, 1991:7-8.

The first stage is *privileged* access, where an organisation has privileged access to resources or markets, for example inherited land, a specific group of human resources or scarce resources such as gold mines or oil fields. The potential competitive advantage is derived not from how the resources are employed, but because rent is generated by resources that are not easily reproducible. In such cases strategies will be focused on maintaining privileged access.

The second stage is *transformation*, where organisations transform resources into products typically using processes inherited from the past. Although the processes may initially be difficult to imitate, organisations operating at stage two have not learned how to change and adapt their processes, which means any competitive advantage derived from transformation activities are only of a temporary of nature.

The third stage is *leverage* and involves changes in established processes or routines. For organisations operating at stage three the key is to attain a competitive advantage through the continual adaptation and renewal of processes and routines that cannot easily be imitated. The outcome of these activities is similar to the concept of a collection of competencies that is developed over time, as described by Dierickx and Cool (1989).

The fourth stage, *regeneration*, is the ability of an organisation to generate a stream of stage three activities over time. Where stage three involves the ability to invent and exploit new processes or routines, stage four involves the ability to establish paradigms and to create climates that will increase the probability of effective stage three activities. This emphasis on

renewal of competencies corresponds with the concept of dynamic capabilities discussed in §3.4.1.

Hogarth, *et al.*'s framework (1991) conforms to the systems principal of equifinality, in that it doesn't suggest a sequential progression through the four stages. Furthermore the stages are not mutually exclusive. In fact it is argued that most organisations will be operating at more than one stage at the same time.

Sustained competitive advantage is dependent on an organisation's capacity to innovate, which in turn depends upon the individual and collective expertise of individuals (Leonard & Sensiper, 2002). As discussed in §2.2.5 and §2.2.6 this expertise or knowledge can either be explicit or tacit in nature. Tacit knowledge is a source of competitive advantage because it is hard to replicate by an organisation itself and by its competitors (Leonard & Sensiper, 2002; Teece, *et al.*, 1997). Explicit knowledge, on the other hand, is accessible to people other than the individuals or groups originating it and therefore easier to imitate or even substitute (Teece, *et al.*, 1997). The perceived importance of these forms of knowledge in an organisation can therefore give an indication of the organisation's capacity to innovate and to create a sustainable competitive advantage.

External sources of knowledge enable an organisation to develop a broader knowledge base, which in turn enables greater strategic flexibility and fuels the innovation process (Bierly & Daly, 2002; Cohen & Levinthal, 1990; Grant, 1996a; Hargadon, 1998). The perceived importance of external knowledge sources could therefore be an indicator of the capacity of an organisation to scan its external environment and to explore external knowledge sources for potential innovation opportunities.

Individuals and groups each do epistemic work the other cannot do (Cook & Brown, 1999). Organisations however often tend to privilege the individual over the group. The balance between the perceived importance of knowledge originating from individuals and knowledge originating from a group could therefore be an indicator of the capacity of an organisation to exploit organisational knowledge to its full potential. The *origin* sub-dimension explores the balance between the perceived importance of individual and collective knowledge by investigating the flow of activities within an organisation, which can be largely individualistic, sequential, reciprocal or collaborative in nature (Van de Ven, Delbecq, & Koenig, 1976).

3.6.4 Enactment

The gist of an organisation's capabilities resides in its organisational processes, which, from a dynamic capabilities perspective, include elements of coordination, integration, reconfiguration and learning. The extent to which such processes are deployed in an organisation could therefore give an indication of the organisation's capacity to be knowledge-centric.

Coordination refers to the activities aimed at achieving a cohesive approach to creating, sharing and using knowledge within an organisation. Being part of an open system, the individual members of an organisation are dependent on one another to the greater the need for effective group coordination (Foss & Mahnke, 2005; Pfeffer, 1997; Pfeffer & Salancik, 1978; Van de Ven, *et al.*, 1976). Also as the levels of task uncertainty or task variability increase, the effectiveness of impersonal coordination mechanisms such as rules, procedures, plans and schedules decrease and the need for personal and group coordination increase (March & Simon, 1958; Van de Ven, *et al.*, 1976). Effective coordination is therefore another key factor in an organisation's ability to survive and grow.

Knowledge creation activities are aimed at introducing variety in an organisation, thereby stimulating the generation of new ideas that may eventually result in innovation. These processes coincide with knowledge exploration activities (March, 1991), or what Foss and Christensen (2001) refer to as Knowledge Problem 2, which in essence is the creation of new knowledge in order to render a competitive advantage sustainable. Stimuli of exploration activities could include knowledge of customers, suppliers, business partners, industry developments or competitors. As discussed in §3.4.1, focussing solely on the exploration of new knowledge sources reduces the speed with which skills at existing competencies are improved (March, 1991) and organisations risk that they may never gain the returns of their knowledge (Levinthal & March, 1993). Dynamic capabilities only emerge if an organisation can simultaneously explore and exploit its knowledge sources and competencies (Easterby-Smith & Prieto, 2008; Levinthal & March, 1993; March, 1991). Organisations therefore need to find a balance between knowledge exploration and exploitation activities.

Knowledge use activities are aimed at knowledge exploitation, in other words leveraging existing knowledge in new contexts. Exploitation activities are aimed at increasing efficiency and ensuring current viability (Easterby-Smith & Prieto, 2008; Levinthal & March, 1993; March, 1991). Knowledge exploitation typically emerges in activities aimed at improving

products, services or efficiency. Conversely to knowledge exploration, organisation that focus exclusively on exploitation activities will struggle to ensure future viability (Levinthal & March, 1993).

Knowledge integration activities are deployed to solve what Foss and Christensen (2001) refer to as Knowledge Problem 1, namely the integration of dispersed knowledge. An organisation's capacity to absorb and share external knowledge does not only depend on its interface with the external environment, but also on the transfer of that knowledge across the organisation (Cohen & Levinthal, 1990). Difficulties in knowledge sharing and integration, together with coordination breakdowns, are considered key factors hindering the outcome of projects (Walz, Elam, & Curtis, 1993). Knowledge can be shared and integrated through social interaction, for example communities of practice or storytelling, or by means of codification of knowledge, for example electronic documents (Haas & Hansen, 2007). The integration of knowledge results in an organisation's collective memory, often with frequently used concepts, methodologies and commonly used terminology as foundation.

For knowledge to be a source of competitive advantage, it has to be rare and inimitable. The personal nature of knowledge however renders it more mobile than most tangible assets (Grant, 1996a). Intellectual property and trade secret protections only offer limited protection to organisations at a considerable cost. In general patents, copyright and trade secrets for example only apply to codified knowledge, excluding tacit knowledge (Liebeskind, 1996). Also patents and copyright offers no protection against observation, and the protection of these mechanisms has a limited lifetime (Liebeskind, 1996). Organisations therefore need to deploy additional isolating mechanisms to protect organisational knowledge from expropriation or imitation by rivals which would diminish its value as a competitive resource (Liebeskind, 1996; Rumelt, 1984). *Knowledge protection* activities, for example alignment of incentives with the protection of knowledge, rules of conduct and job design, aim to protect organisational knowledge from illegal or inappropriate use and theft (Gold, *et al.*, 2001; Liebeskind, 1996).

3.6.5 The viability of a knowledge-centric capability

Helfat *et al.*'s (2007) definition of a dynamic capability proposes that the capacity to perform a task does not refer to superior performance, but rather the ability or potential to perform a task adequately. In order to be able to assess the potential for adequate task performance, the

VSM, as discussed in §2.3.3, is integrated with the concept of knowledge-centric capability, because of its emphasis on essential organisation within a viable system.

Considering a knowledge-centric organisation as an open system, the five sub-systems as conceived by the VSM must at least be present for the knowledge-centric capability to be considered potentially adequate. A mapping of the VSM's sub-systems and their required interactions to the knowledge-centric capability framework is illustrated in Figure 3.5.

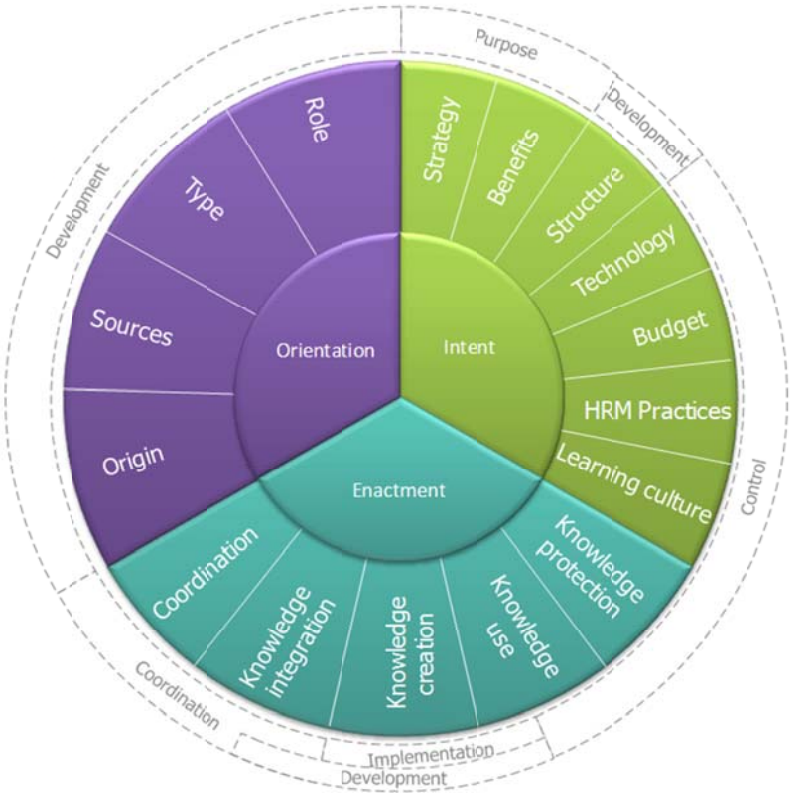


Figure 3.5: Underlying structure of the knowledge-centric capability framework

If the knowledge-centric organisation is the system in focus, System 1 (Implementation) is responsible for *knowledge creation, knowledge use* and *knowledge protection* in performing activities that are related to the organisational goals.

System 2 (Coordination) fulfils the *coordination* function that has to ensure System 1 (Implementation) parts act cohesively and adhere to regulations governing the knowledge infrastructure of the organisation. These regulations prescribe the ways of acting for the parts of System 1 and correspond to the *coordination* and *knowledge integration* activities found in the knowledge-centric capability framework.

System 3 (Control) is responsible for the day-to-day operations of the organisation and has to ensure that the goal to be knowledge-centric is implemented appropriately. This is achieved by translating the overall strategy and identity into operational plans, ensuring that processes are in place to establish a *learning culture*, managing the technological (*technology*), financial (*budget*) and human resources (*HRM practices*) accordingly, and by ensuring that appropriate *knowledge protection* and *knowledge use* processes are in place.

Systems 1-3 however do not have a view of the knowledge-centric organisation's total environment, and therefore do not have the capacity for double-loop learning or renewal. It is the responsibility of System 4 (Development) to develop this capacity. System 4 (Development) therefore needs to provide a *structure* where the external and internal knowledge is brought together and has to facilitate processes aimed at creating the appropriate knowledge (*knowledge creation*), adequately processing knowledge (*knowledge use*), and distributing knowledge (*knowledge integration*) throughout the organisation.

Finally, System 5 (Purpose) needs to convey the purpose of being a knowledge-centric organisation in a clear manner (*strategy* and *benefits*). The purpose also needs to convey a suitable identity or ethos, from which the appropriate learning culture processes can be formulated by System 3.

This mapping of the VSM to the knowledge-centric capability framework shows that the underlying structure of the framework meets the criteria of a viable system. It also shows that the absence of any of the framework's sub-dimensions, or a weakness in any of the relationships between the sub-dimensions, could jeopardise the viability and adequacy of an organisation's knowledge-centric capability as a source of competitive advantage.

Thus far Chapter 3 has argued that an organisation's knowledge-centric capability, rather than distinct knowledge resources, is a key strategic resource of an organisation. In §3.3 the inadequacy of the traditional knowledge-based view was highlighted, while §3.6 presented the knowledge-centric capability framework, based on theory from the literature, as an alternative to the traditional knowledge-based view. §3.6 thus addresses the first research question, namely what dimensions constitute a knowledge-centric capability.

Having outlined the research questions that will be used to address the gaps identified in previous research, Chapter 4 next discusses the research design and methodology that was

used to achieve the research goal of understanding how different knowledge-centric capabilities emerge in different contexts.

CHAPTER 4
RESEARCH DESIGN AND METHODOLOGY

"It is the theory that decides what can be observed."

Albert Einstein

4.1 Research objective

The primary objective of the research is to understand how different knowledge-centric capabilities configure in different organisational contexts. The research objective can be attained by addressing three questions. First, which dimensions can be used to describe an organisation's knowledge-centric capability? Second, given these dimensions, what configurations of knowledge-centric capabilities emerge in different organisational contexts? Third, why do these configurations emerge, in other words, how are the dimensions related to each other within a specific context?

The aim of this chapter is to explain the research design and methodology that was followed to address the research questions, as illustrated in Figure 4.1.

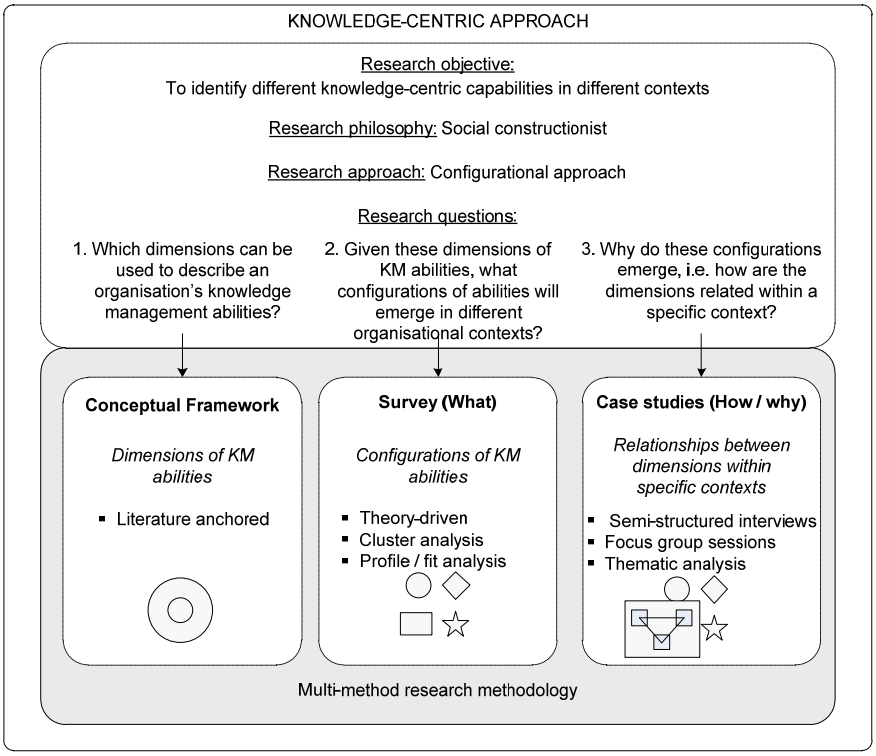


Figure 4.1: Sequential mixed method research strategy

The first research question was addressed by presenting a conceptual framework that was developed based on the previous research findings as discussed in Chapter 3. The remaining two research questions were addressed through primary research methods.

4.2 Research philosophy and approach

4.2.1 Social constructionism

Many knowledge management studies (Botha & Fouché, 2002; Darroch, 2003; Gold, *et al.*, 2001; Khalifa & Liu, 2003; López, *et al.*, 2004; Lucas & Ogilvie, 2006; Ribière, 2001; Sveiby & Simons, 2002; Wong & Aspinwall, 2005) follow a positivistic research philosophy which is characterised by a reductionist analysis of knowledge management. These positivist or empiricist research philosophies posit that only those propositions that can unambiguously be linked to observables are candidates for scientific consideration, and that only the careful testing of scientific propositions can lead to the creation of new scientific knowledge (Gergen & Thatchenkery, 2004). Empiricist research philosophies presume that there is a concrete organisational reality or an objective world, emphasising the need to remain neutral and to remove personal biases from the research. In attempting to statistically isolate the effects of variables, however, complex forms of interaction are downplayed and nonlinear relationships are ignored. For example, in the studies cited above, the context-specific nature of knowledge is ignored, and sets of propositions are postulated as universal truths.

Considering the philosophical foundations of the study, namely knowledge as personal, social and context-specific and the organisation as an open, adaptive system (§2.2.5 and §2.3.2), it becomes clear that a positivistic research philosophy is not appropriate for this study. From a positivist perspective research must be uncontaminated by any factors other than those that strictly pertain to the issue at hand. If knowledge is viewed as context-specific, however, it means that efforts to obtain knowledge take place within specific historical and social contexts that largely determine the way data is acquired, reasoning is conducted, and conclusions are drawn. This view falls within the domain of social constructionism.

Social constructionism is linked to postmodernism as a research philosophy that enforces a reflexive awareness of the way in which the world is perceived and experienced. Social constructionist inquiry typically holds one or more of the following basic tenets. The first is that knowledge of the world is not a product of induction or of the building and testing of general hypotheses (Gergen, 1985). Criticism against the positivist approach of reflecting reality in a decontextualised manner argue that theoretical categories cannot be derived from

observation without relying on one already possessing theoretical categories (Feyerabend, 1976; Kuhn, 1962). Social constructionism thus challenges the conventional view of objective knowledge.

A second assumption is that the terms in which the world is understood are derived from historical social interactions among people. Concepts can have different meanings in different contexts, as illustrated in Figure 4.2.

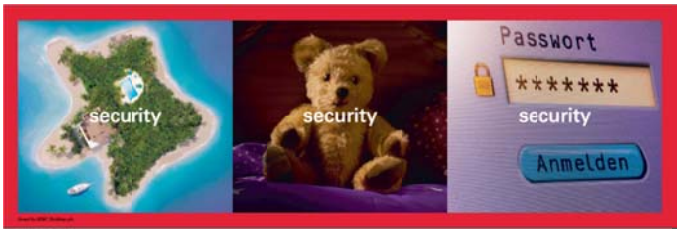


Figure 4.2: Meaning and context

Source: HSBC (2008)

As Gergen (1985: 267) explains: “From the constructionist position the process of understanding is not driven by the forces of nature, but is the result of an active, cooperative enterprise of persons in a relationship”. This means that in order to understand the meaning of something, one must also consider the historical and cultural context from which it emerged.

The third assumption concerns the question of prevailing validity of understanding. From a social constructionist view the degree to which a given understanding is sustained over time is not dependent on the empirical validity of the perspective, but on changeability afforded by social processes such as communication, negotiation and rhetoric (Gergen, 1985). This means that perspectives can be retained or abandoned based on the outcome of a discussion within a specific community. The process of peer-reviewed publishing is an example of establishing validity through social processes such as discourse and negotiation.

The fourth assumption of social constructionism concerns the significance of forms of negotiated understanding in social life, as they are connected with many activities in which people engage (Gergen, 1985). Descriptions and explanations form part of various social patterns, serving to sustain certain patterns to the exclusion of others. Thus, from a knowledge-based view, conceiving the role of the organisation as that of creating distinct knowledge, and misconceptions regarding the nature of knowledge will have a significant impact on organisational behaviour aimed at achieving that goal. This could explain the

fruitless efforts of many knowledge management initiatives. If explicit knowledge is perceived as the expressed form of tacit knowledge, and the role of the organisation is perceived as the creation of distinct knowledge creation, then processes aimed at converting tacit knowledge to explicit knowledge will be sustained, while processes aimed at providing an environment conducive to assimilating tacit knowledge will be excluded.

The goal of the study is to understand how a knowledge-centric capability emerges from the interaction of various organisational entities as a whole, and from the interaction of the organisation as a whole with its external environment. Organisations should therefore be viewed as a function of a particular set of circumstances and individuals, which falls within the paradigm of social constructionism. From the discussion above it is clear that social constructionism affords the opportunity to develop an understanding of the subjective reality of an organisation's knowledge-centric capabilities by exploring its knowledge orientation and knowledge management motives, actions and intentions.

4.2.2 Configurational approach

The epistemological assumptions of social constructionism are non-positivist, suggesting that it is a person's theory that drives all aspects of their empirical inquiry (Mir & Watson, 2000). The conception of knowledge as personal, social and context-sensitive and of the organisation as an open, adaptive and goal-seeking system therefore informs the study's research approach, research design, observation techniques and measurement techniques.

The choice of the study's research approach was largely influenced by the systems thinking concept of equifinality discussed in §2.3.2. Equifinality is a general property of open systems whereby a final state can be achieved from different initial conditions and in different ways (Von Bertalanffy, 1968). Congruent research approaches that hypothesize simple unconditional associations among variables are thus not suited to deal with multiple interacting environmental and structural characteristics present in the concept of equifinality. In order to address the research questions, an approach is needed that moves beyond uncovering relationships that holds across all organisations, and rather focus on multidimensionality and emergence. Configurational theory affords the opportunity to develop a greater understanding of organisational phenomena by identifying distinct, internally consistent sets of organisations.

The study has a strong focus on identifying emerging patterns or configurations of knowledge-centric capabilities. Configurational research aims to identify multidimensional

constellations of conceptually distinct characteristics that commonly occur together (Meyer, *et al.*, 1993). The approach is built on the premise that various "dimensions of environments, industries, technologies, strategies, structures, cultures, ideologies, groups, members, processes, practices, beliefs, and outcomes cluster into configurations" (Meyer, *et al.*, 1993: 1175) which can then be represented in conceptually-developed archetypes. These configurations can also be viewed as a quality or property that varies among organisations (Miller, 1996).

The configurational approach has its roots in organisational analysis and contingency theory. The latter however is concerned with measuring the relationships of a limited set of structural concepts within a limited set of situational concepts (Meyer, *et al.*, 1993). Contingency theory focuses on the behaviour of a social entity by separately analysing its constituent parts, treating organisations as loosely coupled aggregates with relationships being linear and unidirectional, and effective performance largely determined by situational contexts (Drazin & Van de Ven, 1985; Meyer, *et al.*, 1993). These characteristics of contingency theory, as summarised in Table 4.1, emphasise their incompatibility with a systems thinking approach.

Table 4.1 Contingency and configuration approaches compared

Underlying assumptions	Contingency Theory	Configurational Theory
Dominant mode of inquiry	Reductionistic analysis	Holistic synthesis
Social system cohesion and constraint	Aggregates of weakly constrained components	Configurations of strongly constrained components
Relationship among attributes	Unidirectional and linear	Reciprocal and nonlinear
Effectiveness assumptions	Determined by situational context	Equifinality

Adapted from Meyer, Tsui and Hinings (1993: 1177)

Conversely, configurational theory supports the systems thinking concept of holism, by trying to explain how order emerges from the interaction of the parts as a whole (Drazin & Van de Ven, 1985; Meyer, *et al.*, 1993; Miller, 1981). The relationship among variables is also considered to be non-linear, meaning causally related variables in one configuration may be inversed or unrelated in another configuration (Meyer, *et al.*, 1993). Finally, configurational theory supports the systems thinking concept of equifinality, acknowledging that more than one path can lead to the same outcome (Doty & Glick, 1994; Gresov & Drazin, 1997; Ketchen, Thomas, & Snow, 1993; Meyer, *et al.*, 1993).

Based on the discussion above, configurational research is thus considered an appropriate approach to identify configurations of knowledge-centric capabilities within different organisational contexts.

4.3 Mixed method research strategy

Over the years the superiority of two social science methods, namely quantitative methods and qualitative methods, has been intensely debated. More recently, however, many researchers have adopted the view that the two methods are compatible and started to use whatever philosophical approach and methodology was deemed appropriate for the particular study. This approach is called mixed method, or multi-method research strategies.

Mixed method strategies not only use both quantitative and qualitative approaches in collecting and analysing data, but also involve combining the two approaches to ensure the study is of greater strength than when using only qualitative or quantitative research (Creswell, 2009). This approach is what Denzin (1978) called methodological triangulation, i.e. the use of multiple methods to study a research problem. Mixed method strategies are often used to broaden understanding by incorporating both quantitative and qualitative research, or to use one approach to better understand, explain, or build on the results from the other approach. This represents the two types of methodological triangulation as described by Morse (1991). With simultaneous triangulation, data collection of the two methods occurs independently of one another, but during the data interpretation stage the findings complement one another. Sequential triangulation is used when the results of the one method is used to plan the next method, or to better understand or explain the results of the other method.

A sequential mixed method was employed in the study to address the research objective and research questions. The research objective was to identify different knowledge-centric capabilities in different contexts. First a conceptual framework was developed based on the extant literature, in order to identify the dimensions that could be used to describe an organisation’s knowledge management abilities. Second a theory-driven survey, based on the dimensions of the conceptual framework, was employed to obtain the data from which the configurations of knowledge-centric capabilities were derived. Third, case studies were used to explain the emergence of configurations within specific organisational contexts.

The use of a mixed method research strategy has facilitated a broader understanding of knowledge-centric capabilities as a source of organisation heterogeneity by providing rich

data using both qualitative and quantitative methods. Where the cluster analysis provided insight into the types of configurations that emerged, the case studies were used to better understand and explain the conditions under which the configurations emerged.

The mixed method research strategy however also posed a number challenges to the study. First the extensive data collection required careful planning, sequencing and coordination of activities. Second, analysing both numeric and text data proved to be a time-intensive exercise. Finally, the mixed approach required a familiarity with both cluster analysis and case study research methods. The biggest impact of these challenges was on the timeframe within which the study was completed.

4.4 Survey

4.4.1 Survey design

The discussion of knowledge-centric capabilities in §3.6 forms the foundational structure for the knowledge-centric capability framework. The framework comprises three dimensions of knowledge-centric capabilities, namely the intent to create a knowledge-centric environment, an organisation's orientation towards knowledge and organisational enactment of knowledge processes. Each of the dimensions comprises a number of sub-dimensions, as illustrated in Figure 4.3.

Figure 4.3: The knowledge-centric capabilities framework

The knowledge-centric capability framework in turn was used as the theoretical base for the survey. The theory-driven survey thus acted as an enabler to address the gaps in the existing literature, as was illustrated in Tables 3.2 and 3.3.

Investigative questions were formulated for each dimension, after which dominant positions were identified from the literature that could be used to address the investigative questions, as presented in Tables 4.2, 4.3 and 4.4. The dominant positions were then matched with items from existing surveys to enhance reliability and validity of the research questions. Where suitable matches were found, the existing survey questions were either adopted as is or adapted to better fit the purpose of the research. The full survey is included in Appendix B.

Table 4.2: Deriving variables for the Knowledge Intent dimension

KNOWLEDGE INTENT	
What is the organisation's intent in terms of providing an environment in which the organisational knowledge base can be created, extended or modified?	
Sub-dimension	**Dominant position in literature**
Strategy	*The organisation views knowledge as a strategic resource.* · A formal knowledge management strategy exists (APQC, 2005). · Knowledge management is viewed as a business strategy (APQC, 2005) · The knowledge strategy is closely aligned with the business goals (O'Dell, Wiig, & Odem, 1999). · The knowledge strategy is embedded in organisational practices (O'Dell, et al., 1999).
Benefits	*The organisation understands the potential value of managing knowledge.* · The organisation has identified the benefits of managing knowledge (APQC, 2005).
Structure	*The organisation structure facilitates the formal management of knowledge.* · The organisation has a dedicated knowledge management function (APQC, 2005). · Knowledge management roles are embedded in the business units (APQC, 2005). · The organisation makes use of strategic alliances or partnerships to acquire knowledge (Edler, 1999). · The organisation has a dedicated research function (Edler, 1999).
Technology	*The technology used by the organisation is an enabler for knowledge creation, sharing and use.* · The technology used in the organisation supports knowledge processes (Ribière, 2001). · The use and effectiveness of knowledge management systems are monitored (KPMG, 2000). · Everyone in the organisation knows how to use the technology that supports the knowledge processes (APQC, 2005).
Budget	*Financial resources are made available to knowledge management activities within the organisation.* · The organisation has a dedicated budget for knowledge management activities (Edler, 1999).
HRM practices	*The organisation's human resource management practices support knowledge management.* · The competency / skills base of the organisation is actively managed (Edler, 1999). · Knowledge development and transfer is embedded in the organisation's career development system (APQC, 2005). · Motivational approaches tie in with the general compensation structure (Davenport, De Long, & Beers, 1998).
Learning culture	*The organisation's culture is conducive to knowledge creation, sharing and use.* · Organisational goals are frequently communicated and explained (Viitala, 2004). · The direction in which knowledge should be developed is frequently indicated (Viitala, 2004). · Feedback on knowledge initiatives is provided on a regular basis (Holsapple & Joshi, 2000: 141). · Managers regularly receive feedback from sub-ordinates (Viitala, 2004). · Managers develop their own capabilities (Viitala, 2004). · The organisation employs practices that facilitate learning by individuals and by the organisation as a whole (Edler, 1999).

Table 4.3: Deriving variables for the Knowledge Orientation dimension

KNOWLEDGE ORIENTATION	
How is knowledge viewed by the organisation?	
Sub-dimension	**Dominant position in literature**
Types	*Different types of knowledge contribute to the organisation's ability to compete.* · Explicit and tacit knowledge.
Origin	*Knowledge that originates from individuals and collectively contribute to the organisation's ability to compete.* · Individual and collective knowledge.
Sources	*The organisation uses multiple external sources of knowledge.* · Prevalence of multiple external sources of knowledge (Edler, 1999).
Role	*The role of knowledge in providing the organisation with a competitive advantage is understood (Foss, 1998) .* · Contribution of knowledge in different roles to the organisation's ability to compete.

Table 4.4: Deriving variables for the Knowledge Enactment dimension

KNOWLEDGE ENACTMENT	
What does the organisation do to create, extend and modify its knowledge base?	
Sub-dimension	**Dominant position in literature**
Coordination	*Formal processes are in place to coordinate the knowledge management effort.* · Knowledge activities are coordinated in a formal manner.
Knowledge use	*Formal processes are in place to facilitate knowledge use.* · Knowledge use processes are formal.
Knowledge creation	*Formal processes are in place to facilitate knowledge creation.* · Knowledge creation processes are formal.
Knowledge integration	*Formal processes are in place to facilitate knowledge integration.* · Knowledge integration processes are formal.
Knowledge protection	*Formal processes are in place to facilitate knowledge protection.* · Knowledge protection processes are formal.

The purpose of the survey was not to assess knowledge management performance, but rather to evaluate various knowledge-centric contexts. In order to validate the results of the eventual cluster analysis, a number of effectiveness measures were however included in the survey. The areas in which effectiveness was measured are summarised in Table 4.5.

Table 4.5: Deriving variables for effectiveness measures

EFFECTIVENESS	
How effective is the organisation in the following knowledge-related outcomes?	
Focus	**Knowledge-related outcome**
Internal	Inventing new products or services Identifying new business opportunities Coordinating the development efforts of different units Commercialising innovations Avoiding overlap in the development of organisational innitiatives Streamlining internal procesess
External	Anticipating potential market opportunities for new products and services Adapting to changes in the organisation's external environment Anticipating surprises and crises Decreasing market response times

The survey was conducted as an online survey, primarily to automate data capture and to facilitate the administration of the survey. Another consideration was the unreliability of

physical mail in terms of delivery. An Internet search was conducted to identify suitable online survey solutions. Five potential candidates were identified, namely HostedSurvey, QuestionPro, SnapSurveys, SurveyMethods and Vovici. Five criteria points were used to evaluate the solutions. The first criterion was question types. The desired solution had to allow for multiple question types in the survey, specifically list questions, category questions, rating questions, matrix questions, open-ended questions and conditional questions. The second criterion was pricing-model. The solution had to be affordable, and preferably have academic or student pricing available. The third criterion was survey management options. The solution had to provide an interface for administering the survey from within the system and allow for automated invitations, follow-up e-mails and notification to administrator of completed surveys. The fourth criterion was data export. The system had to allow the data that were captured to be exported in a suitable format, such as html, xml or comma-delimited text. This would allow for the data to be imported into data analysis software packages such as Excel and Statistica. The final criterion was flexibility. The system had to be flexible and allow html editing in order to customise the form, layout and appearance of the survey to the respondents.

The survey solution that best met the criteria was HostedSurvey, which is a solution offered by Hostedware. The survey was captured in the online system and each item in the survey was coded using a coding scheme that mirrored the dimensions and sub-dimension of the conceptual framework. All questions in the system were defined as being mandatory, meaning respondents could only progress to the next question, if all the questions on the current screen were completed. This technique aided in minimising the number of cases with missing values. The systems also allowed for respondents to exit from the survey to complete it at a later stage.

4.4.2 Pilot test survey

A pilot test of the survey was conducted to ensure that respondents would not experience problems in answering the questions, and that the online survey would not pose problems.

Five academics and five business managers agreed to participate in the pilot test. The pilot survey was administered in the same way the live survey would be administered. Each pilot test participant was registered in the survey system, after which automated and personalised e-mail invitations were sent from within the system. The automated invitation also included

instructions for completing the survey and asked respondents to keep track of the following while completing the survey, as suggested by Bell (1999):

- how long it took to complete the survey;
- which instructions were unclear;
- which questions were unclear or ambiguous;
- which questions they felt uneasy about answering;
- whether they felt some topics should be included;
- whether the layout and navigation was clear; and
- any other issues that they felt should be addressed.

The system successfully sent the automatic notifications when a person had completed the survey.

At the end of the pilot survey additional questions were included which were used to identify which internet browsers and what type of internet connections were used in completing the survey. Five pilot test participants used a DSL internet connection from home, four a corporate LAN connection and one a wireless internet connection to complete the survey. Furthermore three participants used Internet Explorer 6, four used Internet Explorer 7 and three used Mozilla Firefox without reporting any problems in accessing or navigating through the survey.

The results showed that it took on average 31 minutes to complete the online pilot survey. The feedback was extensively reviewed to ensure the validity of the content and to get an idea of the suitability and reliability of the questions. The survey was then adapted to improve the clarity of a few questions. Twelve questions were removed because of apparent duplication. This reduced the number of questions from 42 to 30 questions. The order and flow of the questions were also changed to ensure they followed in a logical manner for the respondents, rather than following the order of the data requirements table. This reduced the number of screens in the survey from 36 to 29. Test pilot participants also noted that a visual progress indicator would be of great value, and a mechanism was coded in HTML to visually indicate the progress on each screen of the survey. A short description of the purpose of the section, as well as a definition of knowledge was included at the top of each screen.

The adjusted pilot test survey was populated in the survey system and a second pilot test was conducted with two academics and two business managers. The participants in the second

round were satisfied that the questions, scales and instructions were clear and concise, and that the navigation was logical and easy to follow.

4.4.3 The sample

Because of the context-sensitive nature of the research objective and questions, and in order to investigate knowledge management capabilities in different organisational contexts, purposeful sampling techniques were used. Although non-probability sampling does not allow for generalisations to be made, it is best suited to developing an in-depth understanding about the issues central to the study.

Maximum variation (heterogeneity) sampling techniques were used in order to maximise the value of patterns that do emerge from the variation of cases in the sample. The apparent weakness of a small sample is turned into a strength with this technique in two ways. It firstly affords the opportunity to provide in-depth descriptions of the uniqueness of each case, and secondly to identify key themes from any emerging patterns that are of particular interest and value (Patton, 2002).

As recommended by Patton (2002), the sample selection criteria were identified before selecting the sample. The first selection criterion was industry. All industries are dependent on knowledge inputs to some extent. Organisations in industries that are highly dependent on the intensive use of knowledge and skills as input are however more likely to have already given knowledge management some thought and would therefore be more familiar with the context of the survey. The classification system (Amil, Giannoplides, & Lipp-Lingua, 2007) used by Eurostat, the statistical office of the European Communities, classifies manufacturing and service industries according to their global technology- and knowledge-intensity and has been used as the basis for selecting the industries and organisations to be included in the sample.

The second criterion was location of operations, with private organisations whose head office is located in South Africa, or whose operational capacity is largely based in South Africa being included in the sample.

The final sample selection criterion was organisation size and the South African classification of businesses (Republic of South Africa, 2003) was used to classify organisations as small/medium enterprises (20-200 employees) or large enterprises (more than 200 employees).

Applying the criteria of location of operations and organisation size on the Eurostat (Amil, *et al.*, 2007) classification framework, the sample selection framework (Figure 4.4) was developed, with a reduced number of industries from which to select the sample.

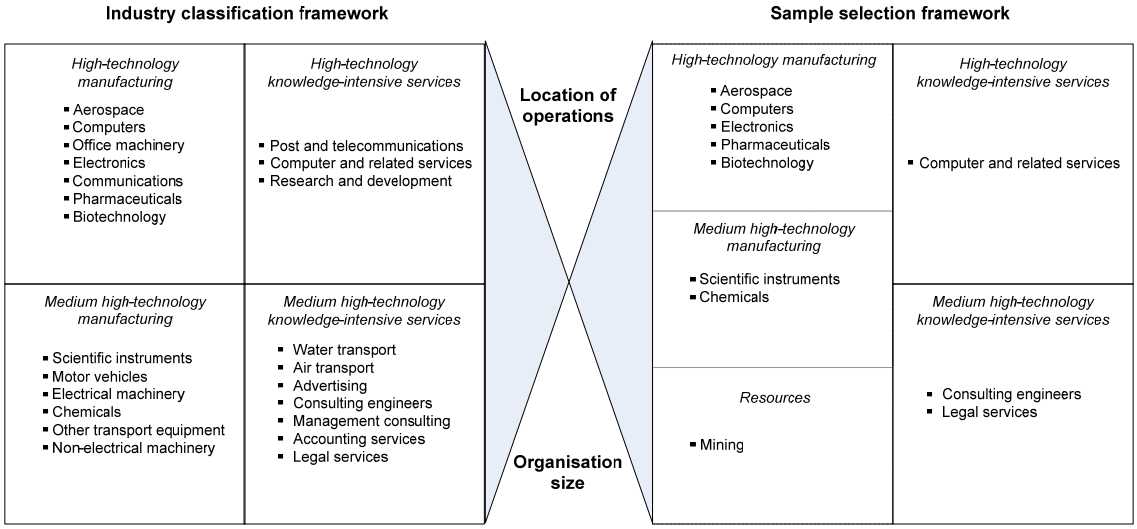


Figure 4.4: Developing the sample selection framework

Industries that were omitted were largely due to the organisations being local subsidiaries of multi-national firms, for example office machinery, motor vehicles, machinery and transport equipment, and therefore not meeting the criterion of location of operations being largely South African. The postal, telecommunication, water and air transport industries were omitted because of substantial government ownership in some of the major players in these industries.

Mbendi Information Services' online directories were used as the sampling frame. A company search was conducted within each of the industries included in the sample selection framework and a list of 1500 organisations compiled. The list of organisations for each industry was scanned for organisations that met the sample selection criteria, from which 70 organisations were purposefully selected for the sample. The distribution of participating organisations across the various industries is presented in Table 4.6.

Table 4.6: Distribution of participating organisations in the sample

Sector	Industry	SME	Large	Total
High technology manufacturing & resources	Biotechnology & Pharmaceutical	6	4	**10**
	Electronic equipment	2	4	**6**
	Chemicals	3	5	**8**
	Resources	0	3	**3**
Knowledge-intensive services	Computer, software and related services	21	4	**25**
	Consulting engineering	5	3	**8**
	Legal services	6	4	**10**
	Total	**43**	**27**	**70**

4.4.4 Data collection procedures

4.4.4.1 Negotiating access

A letter was sent to the managing director or chief executive officer of each organisation in the sample, inviting them to participate in the knowledge management survey and briefly explaining the purpose of the research. The letter also explained that each participating organisation would receive a dedicated feedback report based on their response to the survey, and that all information would be treated as confidential. The letters were printed on the official letterhead of the University of Stellenbosch Business School and sent via the Post Office's Fastmail service. A sample of the letter is presented in Appendix A.

During the first week after sending out the letters, 10 organisations responded to the invitation to participate, with 7 organisations agreeing to participate and 3 organisations declining. The first follow-up round started 10 days after sending out the letters by sending an e-mail addressed to the managing director or chief executive officer of the remaining organisations. This produced a further 17 responses, with 9 organisations agreeing to participate, 6 declining and 2 organisations to come back with an answer at a later stage. The second follow-up round was conducted telephonically, and produced a further 9 responses, with 6 organisations agreeing to participate, and 3 declining.

Of the 70 organisations included in the sample, 22 (31%) agreed to participate, 13 (19%) declined, 2 (3%) were undecided and 33 (47%) did not respond.

Upon agreeing to participate, an organisation was sent an e-mail, proposing a process for participating in the survey. The unit of analysis was individuals and survey participants had to consist of a cross-section of management along with people involved in the knowledge processes within the organisation. The level of analysis was the organisation, as the purpose

of the study was to identify configurations of knowledge-centric capabilities in different organisational contexts. Having more than one participant per organisation complete the survey maximised the variability in the responses of participating organisations. Maximising variability was necessary to ensure the survey results represent an accurate picture of the organisational context of participating organisations.

Each organisation was expected to nominate a coordinator. The coordinator then had to complete a spreadsheet which captured demographical information about the organisation, the contact detail of the coordinator, as well as the names and e-mail addresses of the people in the organisation who would participate in the survey. The coordinator also had to internally notify all participants of the organisation's participation in the survey. A breakdown of the number of participating organisations per industry is summarised in Table 4.7.

Table 4.7: Number of participating organisations relative to candidates

Sector	Industry	SME		Large		Total	
High technology manufacturing & resources	Biotechnology & Pharmaceutical	6	1	4	1	**10**	**2**
	Electronic equipment	2	0	4	0	**6**	**0**
	Chemicals	3	1	5	1	**8**	**2**
	Resources	0	-	3	1	**3**	**1**
Knowledge-intensive services	Computer, software and related services	21	9	4	0	**25**	**9**
	Consulting engineering	5	0	3	3	**8**	**3**
	Legal services	6	0	4	3	**10**	**3**
	Total	**43**		**27**		**70**	**20**

Candidate organisations Participating organisations

Of the 22 organisations that agreed to participate, 20 completed the spreadsheets while 2 organisations indicated that they no longer wished to participate.

4.4.4.2 Administering the survey

Upon receiving the completed spreadsheet, the organisation and survey participants were registered in the survey system. All the participants within an organisation were then sent an automated, personalised e-mail, explaining that their organisation has agreed to participate in the knowledge management survey, and explaining the process for completing the survey. The e-mail also contained the participant's unique link to the online survey. The online survey system sent an automated notification each time a participant had completed the survey, allowing active monitoring of the survey progress. The progress of the completion of the surveys is presented in Figure 4.5.

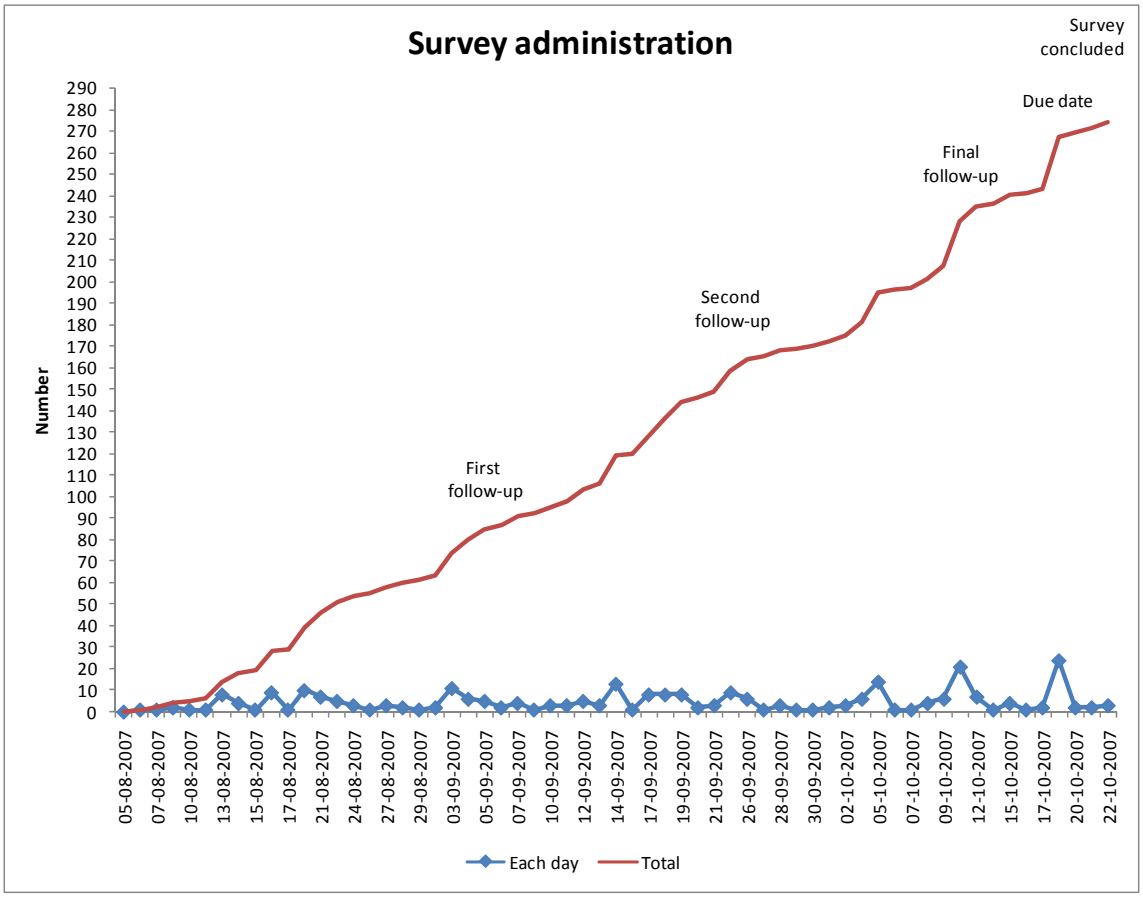


Figure 4.5: Daily and total number of surveys completed

Four weeks after the first invitation to participate was sent, 80 surveys were completed and a follow-up e-mail was sent to all participants who have not yet completed or started the survey, reminding them to do so.

Three weeks later a further 69 surveys were completed and a second follow-up e-mail was sent. Another three weeks later, a further 58 surveys were completed and the final reminder was sent two weeks before the scheduled final date of the survey. By the scheduled due date, a further 36 responses were received. The survey was closed three days after the scheduled due date, during which time a further 31 responses were received.

The online survey was active from 5 August to 22 October 2007. In total 365 participants were registered for the online survey, of which 298 started the survey and 274 completed the survey in full. This represents a response rate of 82% and 92% of the responses were usable. The breakdown of responses is summarised in Table 4.8.

Table 4.8: Response breakdown

Sector	Industry	Size	Participants	Responses		Usable	
HTM	Chemicals	L	11	9	82%	8	89%
HTM	Chemicals	SME	17	15	88%	13	87%
HTM	Pharmaceutical	L	27	22	81%	20	91%
HTM	Pharmaceutical	SME	5	5	100%	5	100%
HTM	Resources (R&D)	L	42	39	93%	38	97%
KIS	Consulting Engineering	L	42	33	79%	33	100%
KIS	Consulting Engineering	L	13	12	92%	11	92%
KIS	Consulting Engineering	L	31	29	94%	25	86%
KIS	Legal Services	L	21	16	76%	13	81%
KIS	Legal Services	L	23	21	91%	21	100%
KIS	Legal Services	L	5	4	80%	3	75%
KIS	Software	SME	18	10	56%	10	100%
KIS	Software	SME	15	13	87%	11	85%
KIS	Software	SME	34	21	62%	20	95%
KIS	Software	SME	32	26	81%	22	85%
KIS	Software	SME	5	5	100%	4	80%
KIS	Software	SME	16	13	81%	12	92%
KIS	Software	SME	2	2	100%	2	100%
KIS	Software	SME	5	2	40%	2	100%
KIS	Software	SME	1	1	100%	1	100%
		Total	**365**	**298**	82%	**274**	92%

4.5 Data analysis

4.5.1 The data set

STATISTICA and Microsoft Excel 2007 were used as the main statistical analytic tools. STATISTICA was selected for its comprehensive cluster analysis capability, while Microsoft Excel 2007 was chosen because of its improved capacity over previous versions to work with large volumes of data.

The data were exported from HostedSurvey to Microsoft Excel. All the nominal data were then transformed to binary values; all 5-point ordinal data were coded on a scale from 1 to 5, and all 3-point ordinal data on a scale from 1 to 3. The data were then imported into STATISTICA for analysis.

The data set consisted of 157 variables, of which 4 variables were identifiers, 5 variables were classifiers, 67 variables measured Knowledge Intent, 32 variables measured Knowledge Orientation, 36 variables measured Knowledge Enactment, 10 variables measured Effectiveness and 3 variables further described the organisational context.

The reliability of the items was tested calculating the Cronbach alpha for the various dimensions, presented in Table 4.9.

Table 4.9: Internal consistency test

Dimension	Items	Mean	S.D.	Cronbach alpha
Intent	67	27.41	6.03	0.77
Orientation	32	19.76	3.97	0.84
Enactment	36	26.25	3.94	0.93
Effectiveness	10	7.37	1.17	0.92

The Cronbach alphas for the Intent, Orientation, Enactment and Effectiveness constructs ranged from 0.77 to 0.93, all within the generally cited minimum of 0.70 (Nunally, 1978). The reliability of the measures could therefore be deemed very good.

4.5.2 Method of analysis

In order to address the second research question, namely what configurations of knowledge management capabilities emerge in different organisational contexts, a method that complements configurational theory and could define homogenous groups of cases from the data had to be used. Cluster analysis overcomes the limitation of techniques that only allow the definition of groups using a narrow set of variables, by permitting the inclusion of multiple variables as sources of configuration definition (Ketchen & Shook, 1996: 442).

Cluster analysis groups cases into clusters, so that the homogeneity of cases in the same cluster is maximised, while the heterogeneity between clusters is maximised (Hair, Black, Babin, Anderson, & Tatham, 2005). It is an interdependence multivariate technique that can discover structures in data without providing dependent or independent variables. The method is therefore dependent on the researcher to specify the characteristics on which the cluster will be based. Figure 4.6 illustrates the high-level process used for performing the cluster analysis.

Cluster analysis essentially involves three elements (Hair, *et al.*, 2005: 569). First, the data set must be partitioned to form clusters, from which a cluster solution is selected. Second, the clusters must be interpreted by understanding the characteristics of each cluster. Each cluster is then named or labelled to define its nature. Third, the results of the final cluster solution must be validated.

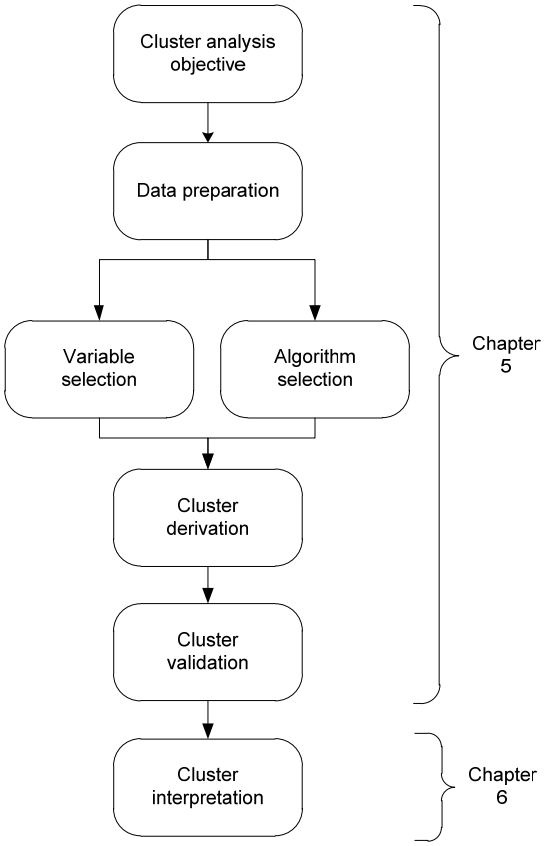


Figure 4.6: Cluster analysis process

The cluster analysis process and results are discussed in Chapter 5 up to the validation of the cluster solution. The interpretation and labelling of the clusters are discussed separately in Chapter 6.

4.5.3 Cluster analysis objective

Cluster analysis can be used to identify natural groups in data, to simplify data or to identify relationships (Hair, *et al.*, 2005). The purpose of the research was to understand what configurations emerge in different organisational context, and why they emerge, making relationship identification a suitable objective of the cluster analysis.

4.5.4 Variable selection

Selecting the variables along which observations should be grouped is probably the most fundamental step in cluster analysis, since the variables selected will characterise the cases being clustered and the technique cannot differentiate between relevant and irrelevant variables. The inductive nature of the study made it impossible to know in advance which variables will differentiate among the observations. An inductive approach (Ketchen &

Shook, 1996) was therefore followed in selecting the variables, using as many variables as possible to maximise the likelihood of discovering meaningful differences. The objective of the cluster analysis should guide the selection of variables (Hair, *et al.*, 2005; Jurowski & Reich, 2000; Ketchen & Shook, 1996). In order to understand what configurations of knowledge-centric capabilities emerge in different contexts, a total of 70 variables were selected. The overall guiding principle was to assess the prevalence of knowledge-centric activities as opposed to the nature of the activities.

To determine the extent of an organisation's intent to create a knowledge-centric environment, 25 variables that measure the prevalence of intent, rather than the nature of intent were selected for inclusion in the cluster analysis. Using the strategy sub-dimension as an example, this meant including the variable that measures whether an organisation has a formal knowledge management strategy or not, as opposed to what the strategy encompasses. The variables for the Intent dimension are presented in Table 4.10.

Table 4.10: Variables for the Intent dimension

KNOWLEDGE INTENT		
Sub-dimension	**Variable**	***Description***
Strategy	KI_01	*The organisation has a formal knowledge management strategy*
Value	KI_02	*The organisation has identified areas where managing knowledge can add significant benefits to the organisation.*
Structure	KI_03	*The organisation has a formal knowledge management function.*
	KI_04	*The organisation has designated roles within business units with the responsibility to encourage and enable knowledge sharing and use.*
	KI_05	*The organisation has a formal research function.*
Technology	KI_06	*The technology used by the organisation supports knowledge management.*
	KI_07	*The organisation actively monitors the use and effectiveness of technologies used in the organisation.*
	KI_08	*Managers and employees have received training to use these technologies.*
Budget	KI_09	*The organisation has dedicated budgets for knowledge management activities.*
	KI_10	*Don't have a dedicated budget for KM activities, but expect to have within the next 24 months.*
HRM practices	KI_11	*Knowledge usage is considered in appraisal interviews and salary negotiations.*
	KI_12	*The organisation has some form of incentive for creating, sharing or using knowledge.*
	KI_13	*Balance between measurement and reward of individual and collective performance.*
Culture	KI_14	*Formal training is provided for KM activities.*
	KI_15	*Formal mentoring practices are used.*
	KI_16	*The organisation arranges for employees to interact with new or less experienced employees.*
	KI_17	*Off-site training is offered to keep skills current.*
	KI_18	*The organisation arranges for employees to participate in project teams with external experts.*
	KI_19	*Employees are encouraged to explore and experiment.*
	KI_20	*Employees are encouraged to ask others for assistance when needed.*
	KI_21	*Employees are encouraged to discuss their work with people in other teams.*
	KI_22	*Organisational goals are frequently communicated and explained.*
	KI_23	*The direction in which knowledge should be developed is clearly indicated.*
	KI_24	*Regular feedback is provided on knowledge initiaitives.*
	KI_25	*Managers learn and develop their own capabilities on a regular basis.*

To determine how an organisation orientates itself towards knowledge, 14 variables that measure its orientation towards different types, origins and external sources of knowledge were selected. Variables assessing the role of knowledge in the organisation were excluded from the cluster analysis in order to be able to explore the relationship between the emerging configurations of knowledge-centric capabilities and the role of knowledge in the

organisation after the cluster analysis. The variables selected for the Orientation dimension are presented in Table 4.11.

Table 4.11: Variables for the Orientation dimension

KNOWLEDGE ORIENTATION		
Sub-dimension	**Variable**	***Description***
Types	KO_01	*Capture knowledge of experts*
	KO_02	*Provide relationship-building experiences*
	KO_03	*Identify and share best practices*
	KO_04	*Provide opportunities to develop new skills*
Origin	KO_05	*Employees work independently and knowledge doesn't flow between them.*
	KO_06	*Work and knowledge flow between employees, but only in one direction.*
	KO_07	*Work and knowledge flow between employees in back-and-forth manner*
	KO_08	*Employees collaborate as a group at the same time to deal with work and knowledge.*
Sources	KO_09	*Universities and other research institutes are used as a source of knowledge*
	KO_10	*Private research institutes are used as a source of knowledge*
	KO_11	*Management consultancies are used as a source of knowledge.*
	KO_12	*Industry and professional bodies are used as sources of knowledge*
	KO_13	*Specialist literature and events are used as sources of knowledge.*
	KO_14	*Database and Internet Searches are used as sources of knowledge*

To assess the prevalence of an organisation's knowledge-centric activities, 31 variables that measure formal actions of coordination, knowledge use, knowledge creation and knowledge integration were selected, while variables assessing the nature of an organisation's knowledge protection actions were excluded. The variables selected for the Enactment dimension is presented in Table 4.12.

Variables measuring effectiveness, defined as the organisational ability to perform knowledge-related activities, were not included in the cluster analysis. The effectiveness variables were used to validate the cluster relationship, which requires the use of a variable to show a theoretically based relationship to the cluster variables. The variables used for validation purposes can therefore not be included in the cluster solution.

Table 4.12: Variables for the Enactment dimension

KNOWLEDGE ENACTMENT

Sub-dimension	Variable	*Description*
Coordination	KE_01	*Sources of knowledge are matched to problems and challenges.*
	KE_02	*Knowledge is made accessible to those that need it.*
	KE_03	*Employee skills and expertise are mapped to the organisation's knowledge requirements.*
	KE_04	*Knowledge is filtered.*
	KE_05	*Knowledge is organised.*
Knowledge use	KE_06	*Knowledge learned from mistakes is applied through a formal process.*
	KE_07	*Knowledge learned from past experiences is applied through a formal process.*
	KE_08	*Knowledge is used in the development of new products or services through a formal process.*
	KE_09	*Knowledge is used to solve problems through a formal process.*
	KE_10	*Knowledge is used to improve efficiency through a formal process.*
	KE_11	*Knowledge is used to adjust the straetgic direction through a formal process.*
	KE_12	*Knowledge about competitors is converted into plans of action through a formal process.*
Knowledge creation	KE_13	*Knowledge about customers is created through a formal process.*
	KE_14	*New insight is generated from existing knowledge through a formal process.*
	KE_15	*Knowledge about suppliers is created through a formal process.*
	KE_16	*Feedback from projects is used to improve subsequent projects through a formal process.*
	KE_17	*Knowledge is exchanged with business partners through a formal process.*
	KE_18	*Knowledge about new products or services within the industry is created through a formal process.*
	KE_19	*Knowledge about competitors is created through a formal process.*
	KE_20	*Performance is benchmarked through a formal process.*
	KE_21	*Best practices are identified through a formal process.*
	KE_22	*Knowledge is exchanged between individuals through a formal process.*
Knowledge Integration	KE_23	*Knowledge is distributed in the organisation through a formal process.*
	KE_24	*Organisational knowledge is transferred to individuals through a formal process.*
	KE_25	*Knowledge from individuals is absorbed into the organisation through a formal process.*
	KE_26	*Knowledge from business partners is integrated into the organisation through a formal process.*
	KE_27	*Different sources and types of knowledge is integrated through a formal process.*
	KE_28	*Outdated knowledge is replaced through a formal process.*
	KE_29	*Frequently used concepts and methodologies are captured and shared through a formal process.*
	KE_30	*Stories about organisational successes and failures is shared through a formal process.*
	KE_31	*Terminology commonly used within the organisation is captured and shared through a formal process.*

4.5.5 Data preparation

Three important issues need to be considered in preparing the data for the cluster analysis, namely (1) whether the data should be standardised, (2) whether outliers can be detected and (3) whether multi-collinearity is substantial enough to affect the results (Hair, *et al.*, 2005).

Where different scale values exist in the data, clustering variables should be standardised if possible. Cluster analysis groups cases in such a manner that the distance between the clusters along all clustering variables is maximised (Ketchen & Shook, 1996), making cluster analysis sensitive to differing scales or magnitudes among variables.

The data consisted of both nominal and ordinal data, with the latter being rated on 3-point and 5-point likert-type scales. We define x_{ij} as the value of the j^{th} variable (the response) of the i^{th} observation (case). To avoid the potential effect of scale differences among variables (response scales), the data was standardised using the maximum magnitude of 1 method. The standardised value z_{ij} is derived by dividing each value x_{ij} by the maximum of the x_{ij} values in column j defined as $CMAX_j$:

$$z_{ij} = \frac{x_{ij}}{CMAX_j} \quad \ldots(4.1)$$

The data was searched for outliers by looking for observations with large distances from all other observations. Variables included in the cluster analysis should also be examined for substantial multi-collinearity (Hair, *et al.*, 2005). The Mahalanobis distance measure is the distance of an observation (z_i) from the centroid of all the cases in a space defined by the independent variables (Hair, *et al.*, 2005), and was used to examine the variables for multi-collinearity.

Formally The Mahalanobis distance measure for observation *i* is defined as:

$$MD_i = \sqrt{(\boldsymbol{z}_i - \boldsymbol{\mu})^T \, C^{-1} \, (\boldsymbol{z}_i - \boldsymbol{\mu})} \quad \ldots(4.2)$$

where $\mathbf{z_i}$ is the vector comprising the i^{th} observation's variables, and $\boldsymbol{\mu}$ represents the mean observation while C is the covariance matrix for $\mathbf{z_i}$.

Table 4.13 contains the Mahalanobis distance values for each observation. As shown, observation 104 has a distance value substantially higher than the remaining observations. Although no cut-off value designates an observation as an outlier, extremely high relative values indicate observations that are quite distinct from the other observations across the set of clustering variables (Hair, *et al.*, 2005). Whether this outlier will be eliminated or not will

only be decided when examining the clustering schedule for the emergence of outliers in the clustering process in §5.2.2.

Table 4.13 Identifying potential outliers

Observation	Mahalanobis	Observation	Mahalanobis
104	121.8	158	85.4
213	113.7	142	84.5
185	113.4	3	84.5
106	113.1	49	84.4
156	109.2	45	84.3
194	108.7	209	84.3
148	108.6	171	84.2
58	107.3	51	84.1
192	106.8	76	83.9
6	103.1	196	83.8
34	102.0	91	83.5
46	101.2	26	83.4
11	101.1	217	83.3
54	100.1	107	83.2
25	99.3	236	82.3
173	99.2	268	82.1
132	98.6	191	81.8
2	98.0	63	81.8
245	97.5	222	80.7
193	97.0	78	80.6
280	95.6	127	80.5
200	95.2	75	80.4
35	95.2	41	80.2
296	94.6	293	80.1
244	94.5	216	80.1
260	94.3	267	80.0
9	93.1	131	79.9
176	92.9	32	79.8
238	92.6	165	79.6
89	92.5	226	79.3
147	92.5	112	79.1
266	92.0	288	78.9
271	91.5	62	78.9
146	91.1	169	78.9
273	90.5	101	78.5
172	90.1	120	78.1
214	90.0	22	78.0
115	90.0	157	77.7
294	88.7	188	77.7
138	88.0	255	77.2
66	88.0	110	77.1
246	87.2	50	76.5
130	87.1	114	76.4
95	86.2	275	76.4
174	86.1	39	76.1
105	86.0	204	76.0
227	86.0	17	75.9
170	85.9	290	75.9
269	85.8	278	75.7
116	85.4	282	75.6

4.5.6 Algorithm selection

Clustering algorithms refer to the set of rules or procedures that are used to sort the observations into different clusters. Two types of algorithms can be distinguished, namely hierarchical and non-hierarchical. Hierarchical algorithms join cases together in successively larger clusters using a measure of similarity or distance. This resulting treelike diagram represents the cumulative combination of clusters which culminates in a complete set of cluster solutions, ranging from each observation forming its own cluster, to all observations forming one cluster. A few of the popular algorithms include (1) single linkage, (2) complete linkage, (3) average linkage, (4) centroid method, and (5) Ward's method (Hair, *et al.*, 2005; Romesburg, 2004).

The complete linkage method, also known as the furthest neighbour method, was used in the analysis of the data. This method determines the distance between clusters by the greatest distance between any two objects in the different clusters. An observation is therefore joined to a cluster if it has a certain level of similarity with all current members of the cluster (Punj & Stewart, 1983). The advantage of using a hierarchical clustering algorithm is that the number of clusters needn't be known or stated upfront, making it the best method to identify the number of clusters. Another fundamental concept of cluster analysis is that of similarity. In cluster analysis inter-object similarity is most commonly measured using a distance measure (Hair, *et al.*, 2005). Distance measures, or resemblance coefficients, present similarity as the proximity of observations to one another across the cluster variables, actually measuring dissimilarity (Romesburg, 2004). Smaller values denote more similarity and larger values more dissimilarity. The most common distance measure used in cluster analysis is Euclidean distance (Figure 4.7) and is calculated with the following formula:

$$Distance_{x,y} = \left[\sum_i (x_i - y_i)^2\right]^{\frac{1}{2}} \quad \ldots(4.3)$$

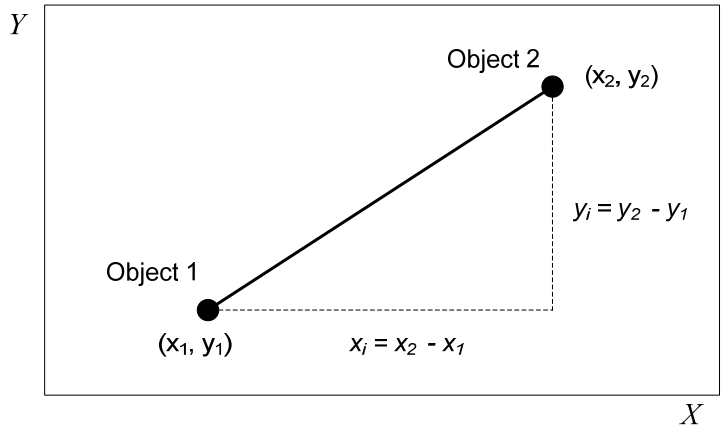


Figure 4.7: An example of Euclidean distance

Source: (Hair, *et al.*, 2005: 575)

A distinct disadvantage of the hierarchical methods however is that these algorithms make only one pass through the data set, which means a poor cluster assignment cannot be modified because there are no subsequent passes through the data (Ketchen & Shook, 1996).

Non-hierarchical algorithms, or K-means clustering, can resolve this problem. By making multiple passes though the data, K-means clustering optimises within-cluster homogeneity and between-cluster heterogeneity (Ketchen & Shook, 1996). A disadvantage of K-means algorithms is that the number of clusters must be specified up front. Following the recommendations of some experts (Hair, *et al.*, 2005; Punj & Stewart, 1983), a two-staged process was followed to derive the final cluster solution.

4.5.7 Cluster derivation, interpretation and validation

The two-staged process used to derive the cluster solution is illustrated below in Figure 4.8.

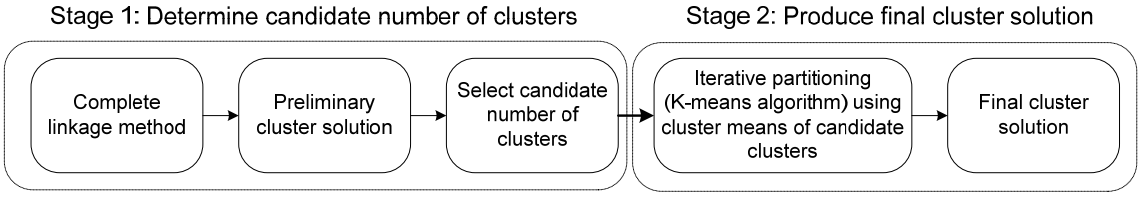


Figure 4.8: Two-stage clustering

First the hierarchical complete linkage method was used to generate a preliminary cluster solution. The resulting tree diagram and agglomeration schedule were examined for heterogeneity between clusters at each successive step, in order to select the candidate

number of clusters. K-means cluster analysis was then performed on the same data set, with the number of clusters specified from the candidate number of clusters acting as initial seed points. This method produced the final cluster solution. Because cluster analysis will produce a solution even if there are no natural groupings in the data, two techniques were used to derive and validate the cluster solution. The first technique (Hair, *et al.*, 2005; Ketchen & Shook, 1996) compared the solutions produced by multiple cluster analysis algorithms, both hierarchical and non-hierarchical. The degree of consistency in the solutions was used as in indicator of reliability. Criterion-related validity was then assessed by selecting and testing variables that was not used to form the clusters (Hair, *et al.*, 2005; Ketchen & Shook, 1996), but were expected to vary across the clusters.

The interpretation of the clusters involved examining each cluster in terms of the clustering variables. The interpretation process involved comparing the mean scores of the clusters on the clustering variables. Cluster profiles derived from the data were used to identify distinguishing characteristics for each cluster. Heat maps were further employed to perform a visual analysis of the clusters in order to interpret the distinguishing characteristics. A heat map is a data visualisation which uses colour to represent data values in a two-dimensional image, as illustrated in Figure 4.9.

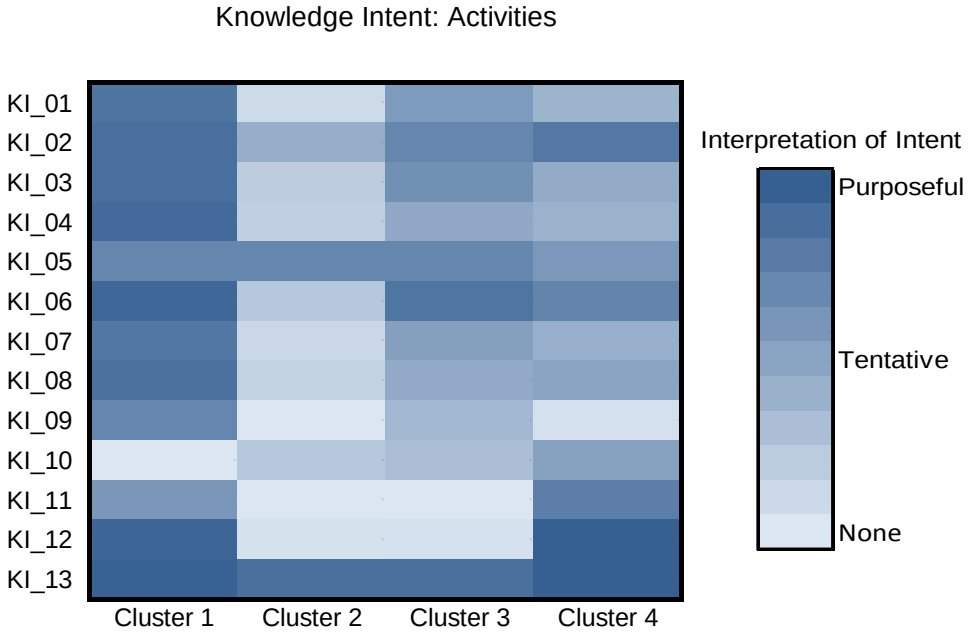


Figure 4.9: Heat map example

The coloured cells represent the mean scores of the clusters (x-axis) on the clustering variables listed on the y-axis. The scale presented on the right-hand side of the heat map explains the key that was used to interpret the heat map.

The interpretation of the distinguishing characteristics of each cluster was then used to assign labels to the cluster.

4.6 Case study

4.6.1 Introduction

Case studies were used to address the third research question, namely why the identified configurations emerged in different organisational contexts. Case studies afford the opportunity to explore the context in which decisions were made, why they were made, how they were implemented and what the outcome of the decisions was (Schramm, 1971). In other words, case studies enable the researcher to investigate organisations within its real-life context (Yin, 2003). Here it is important to recall the characteristics of a social constructionist research philosophy discussed in §4.2.1, in particular the assumption that to understand the meaning of something, one also has to understand the historical and cultural context in which it emerged. Considering this assumption of a social constructionist research philosophy, case studies are deemed a particularly useful and synergetic approach to understand why the different knowledge-centric capabilities emerged in different organisational contexts.

Case studies comprise a comprehensive method, as illustrated in Figure 4.10. The case study process comprises four phases, i.e. case study design, data collection, data analysis and the case study composition. A number of design tests were conducted within each of the phases to ensure the validity of the various case studies.

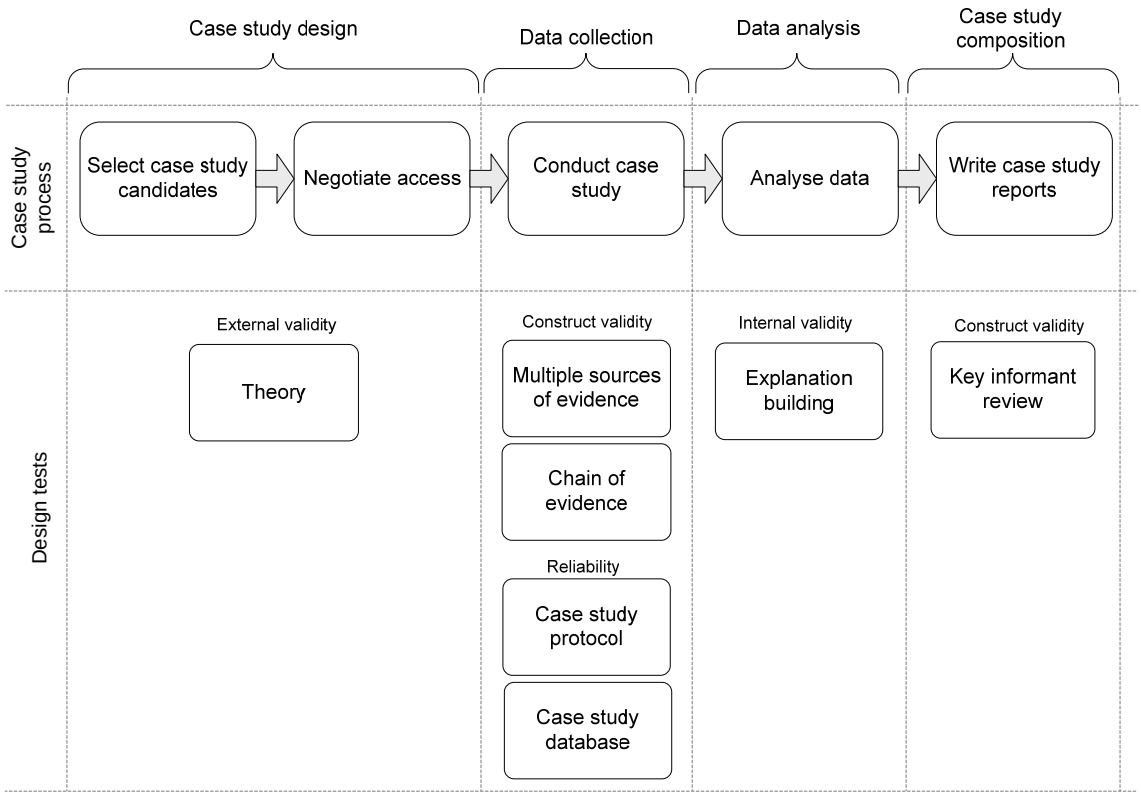


Figure 4.10: Case study process and design tests

Adapted from Yin (2003)

The four phases are discussed next, along with the design tests that were conducted in each of the four phases.

4.6.2 Case study design

Because multiple surveys were completed per organisation, it could be expected that most organisations would be distributed between two or more clusters. It is important to recall that the purpose of the cluster analysis was not to group organisations into single clusters, but rather to understand what clusters, i.e. different configurations of knowledge-centric capabilities, would emerge. The purpose of the case studies was therefore to explore why a particular cluster emerged, i.e. why a particular configuration of knowledge-centric capabilities emerged. To study the reasons for the emergence of a configuration of knowledge-centric capabilities within a specific context, organisations with the largest representation in a particular cluster could therefore be considered as potential case study subjects.

Since little evidence of similar sequential multi-method approaches could be identified, case study candidates were selected using three additional arbitrary selection criteria points. The first criterion was that at least 10 respondents of the candidate organisation must have completed the survey. Second, at least 35% of all the respondents in a candidate organisation had to fall in the primary cluster. Finally the percentage of respondents in the primary cluster had to be at least 10% more than the organisation's respondents in the secondary cluster. The combined criteria would ensure that enough case study participants were available within each organisation, and that an organisation's distribution between different clusters is significant enough to provide insight into the emergence of the configuration of knowledge-centric capabilities being studied.

During negotiation for participation in the survey, organisations were asked to give an early indication of whether they'd be interested to participate in a case study. Along with receiving the dedicated feedback report, each organisation was again prompted for participation in a case study. Organisations that met the case study selection criteria and have expressed interest in participating in a case study were explained the requirements for participating in a case study. The requirements included a semi-structured interview with the person closest to the knowledge management process in the organisation, for example the Chief Knowledge Officer or knowledge management champion. If no such role existed, the interview was conducted with the Chief Executive Officer or Managing Director. A further requirement was focus group sessions with all the survey participants in the organisation that clustered in the primary cluster.

The questions of the semi-structured interviews and focus group sessions were compiled using the responses to the theory-driven survey as a point of departure. Where survey research relies on statistical generalisation, case studies rely on analytical generalisation (Yin, 2003) to test for external validity. The results of the cluster analysis provided the theory to be investigated by the case studies, by asserting that different configurations of knowledge-centric capabilities emerge in different contexts. Employing analytical generalisation as a test for external validity, the case studies thus endeavoured to generalise the case study results to the theory developed through the cluster analysis.

4.6.3 Data collection

Four organisations participated in the case studies. Data were collected through 4 semi-structured interviews and 5 focus group sessions at the participating organisations. The level of analysis for the case studies was the knowledge management activities within an organisation. In addition to collecting the primary data about the organisation through individual interviews and focus group sessions, organisational documentation available in the public domain was used as a source of secondary data. Using interviews, focus groups and documentation as multiple sources of evidence assisted with ensuring construct validity.

A standard set of procedures and a set of questions based on the survey responses were compiled for each interview and focus group session. Each interview and focus group session was conducted using this case study protocol, presented in Appendix C, as a guide to ensure the reliability of the case study process.

The purpose of the case study was explained to the contact persons of the respective companies beforehand, and repeated at the beginning of each interview and focus group session.

In case study research case study questions can occur at different levels. Level 1 questions represent the questions specifically asked of interviewees, i.e. the verbal line of inquiry, while Level 2 questions represent the questions asked of the individual case, i.e. the mental line of inquiry (Yin, 2003). The Level 1 questions were derived from the company's survey responses. The Level 2 questions were kept in mind to structure the inquiry, acting as reminders regarding the information that needed to be collected and why. The Level 2 questions therefore were used to address the final research question, i.e. why do the various knowledge-centric configurations emerge in specific organisational contexts.

All interviews and focus group sessions were recorded. The interviews and focus group sessions, totalling 470 minutes, were transcribed using InqScribe software. The transcriptions of the case studies are presented in Appendix D, E, F and G respectively.

Another tactic employed to strengthen the reliability of the case study research was to develop a case study database. The purpose of a case study database is to organise and document the data collected for the case studies, so that in principle, other researchers could review the evidence directly and not be limited to written case study reports (Yin, 2003).

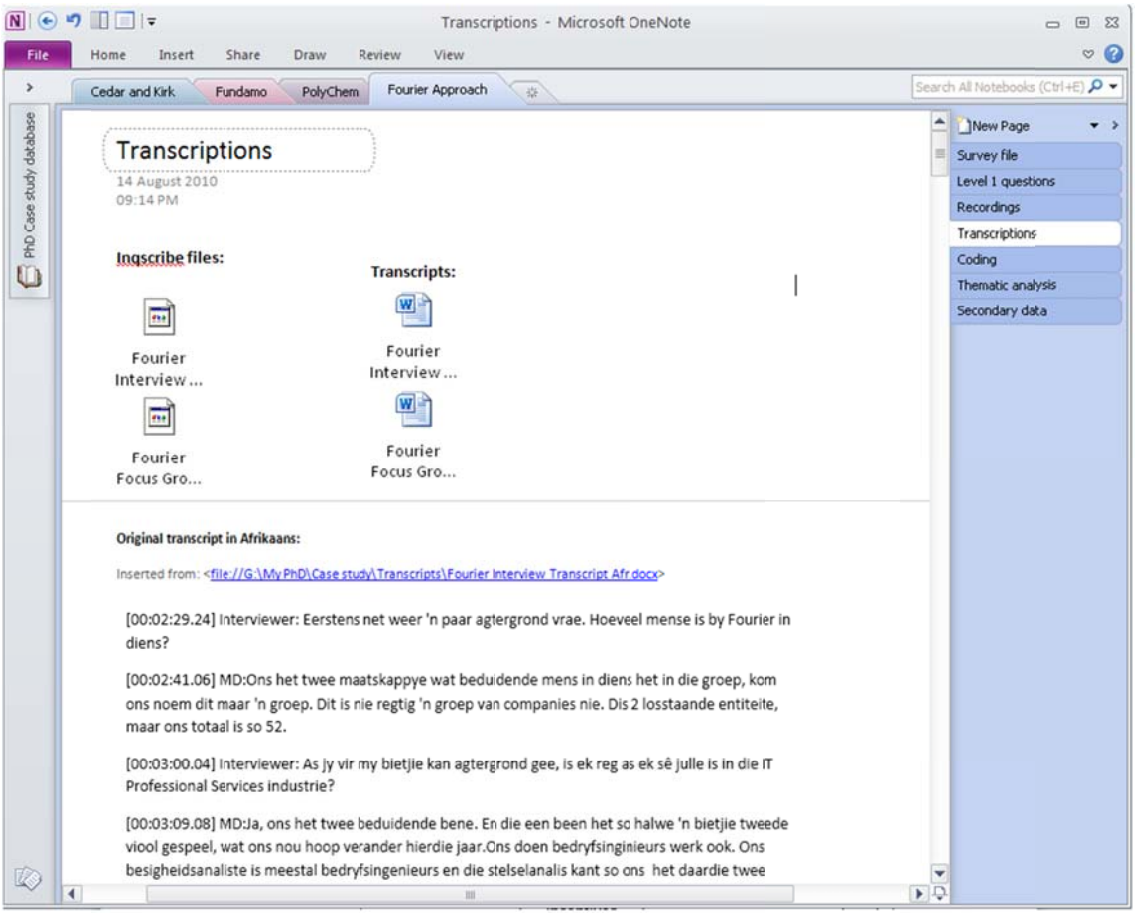


Figure 4.11: Case study database

The case study database illustrated in Figure 4.11 was developed in Microsoft OneNote, with a folder for each case study and separate pages for the survey file, level 1 questions, audio recordings, transcriptions, coding, thematic analysis and secondary data. In order to provide access to the evidence as part of this dissertation, the Level 1 questions are included in Appendix C, the transcriptions are included in Appendices D, E, F and G and the lists of codes are included in Appendices H, I, J and K. The thematic analysis is included in the case study reports and secondary data has been referenced as required.

The data collection process also focused on establishing a chain of evidence, which as suggested by Yin (2003), increases the validity of the study. The chain of evidence allows the case study reader to follow the derivation of any evidence from initial research questions to the ultimate case study conclusions, in either direction (Yin, 2003) as illustrated in Figure 4.12.

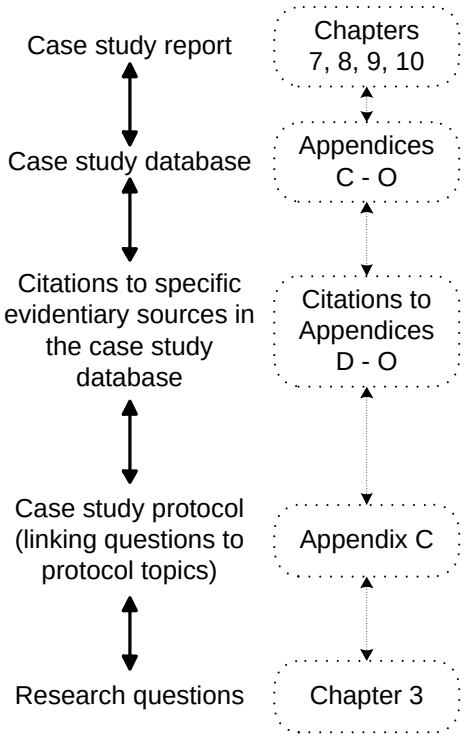


Figure 4.12: Establishing a chain of evidence

Adapted from Yin, 2003: 106

In this study it means the reader can follow any evidence from the research questions presented in Chapter 3, to the case study protocol in Appendix C, to the citations presented in the various case study chapters, back to the original source in Appendices D to O, through to the respective case studies in chapters 7 to 10.

4.6.4 Data analysis

The general analytic strategy for the case study research was based on developing case descriptions which would describe the conditions under which each of the configurations of knowledge-centric capabilities emerged. The transcriptions were analysed by coding the data and identifying themes from the data.

Coding requires viewing the data through an analytic lens, and how what is happening in the data is interpreted depends on the filter applied to that analytic lens (Saldaña, 2009). The purpose of the case studies was to develop an understanding of why the various configurations of knowledge-centric capabilities emerged in specific organisational contexts.

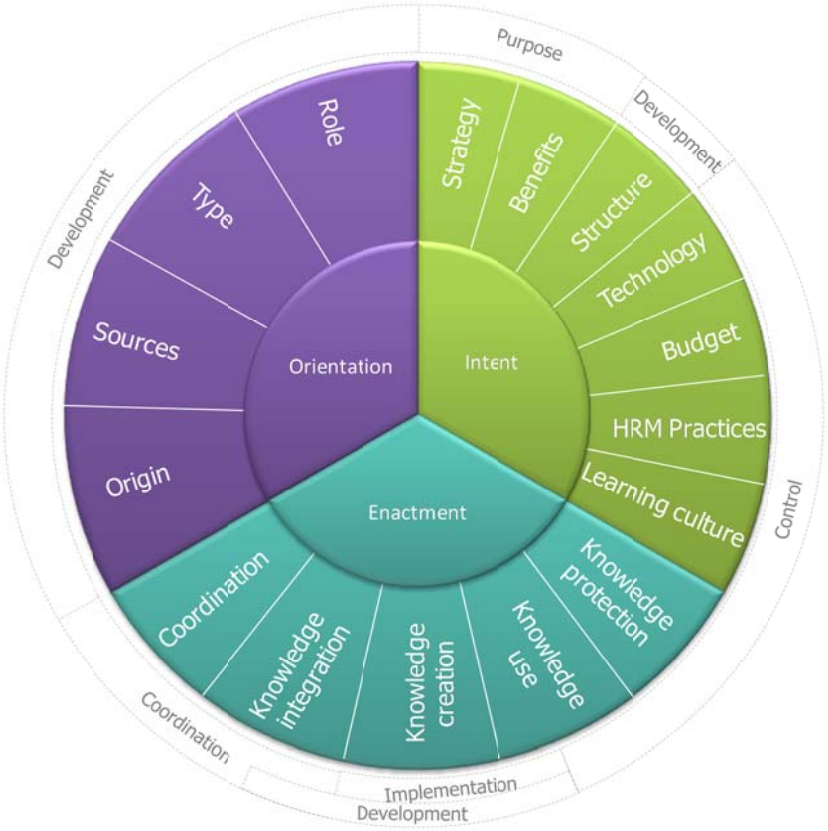


Figure 4.13: Filter applied to the analytic lens

The filter that was applied to analysing the data thus comprised the dimensions of a knowledge-centric capability, as well as the organisation-as-systems view as presented by the VSM, described earlier in §3.6.5 and presented above in Figure 4.13.

Two coding cycles were used to transition from data collection to the more extensive data analysis. Initial coding, as described by Saldaña (2009) was used during the first cycle coding process, breaking down the qualitative data into discrete parts which allowed comparing them for similarities and differences. During this cycle all proposed codes were treated as provisional and some codes were reworded as the analysis progressed. In Vivo codes were mostly used during the first cycle, which assisted in crystallising and condensing the meanings from the data. An example of the thematic analysis process is illustrated in Figure 4.14.

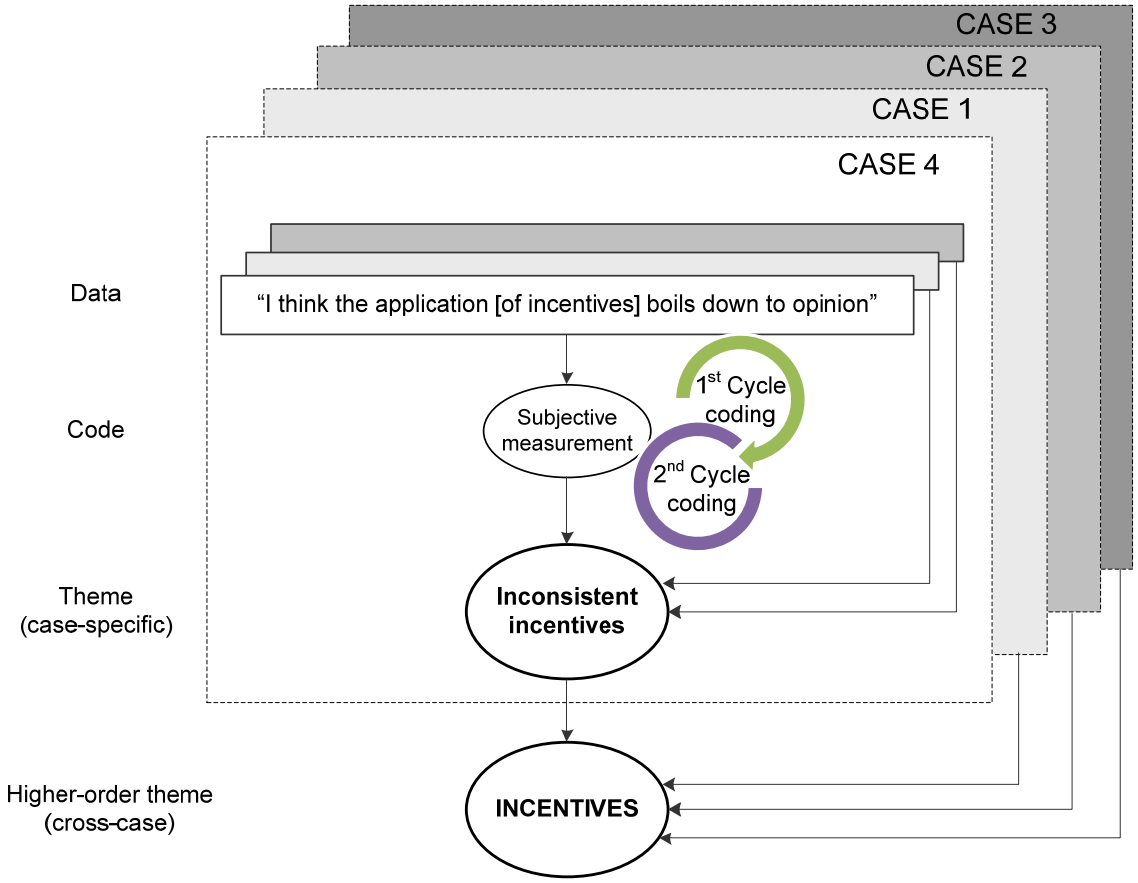


Figure 4.14: Example of thematic analysis

Focused coding was used during the second cycle of coding, searching for the most significant initial codes, which were later used for developing case-specific and higher-order themes. In the process some initial codes were eliminated while others were combined. The resulting code lists are presented in Appendices H, I, J and K respectively.

The various codes were next explored for recurrence, repetition and forcefulness and case-specific themes were identified accordingly, keeping the filter applied to the analytic lens in mind. A process of explanation building was used to identify the interrelationships that emerged between the various themes, ensuring the internal validity of the case studies.

An interrelationship is defined as the "qualitative 'correlation' that examines possible influences and affects within, between and among categorised data" (Saldaña, 2009). These interrelationships were established through an iterative process of examining case study evidence and theoretical positions, and were presented in a model of the interrelationships, as outlined in Figure 4.15.

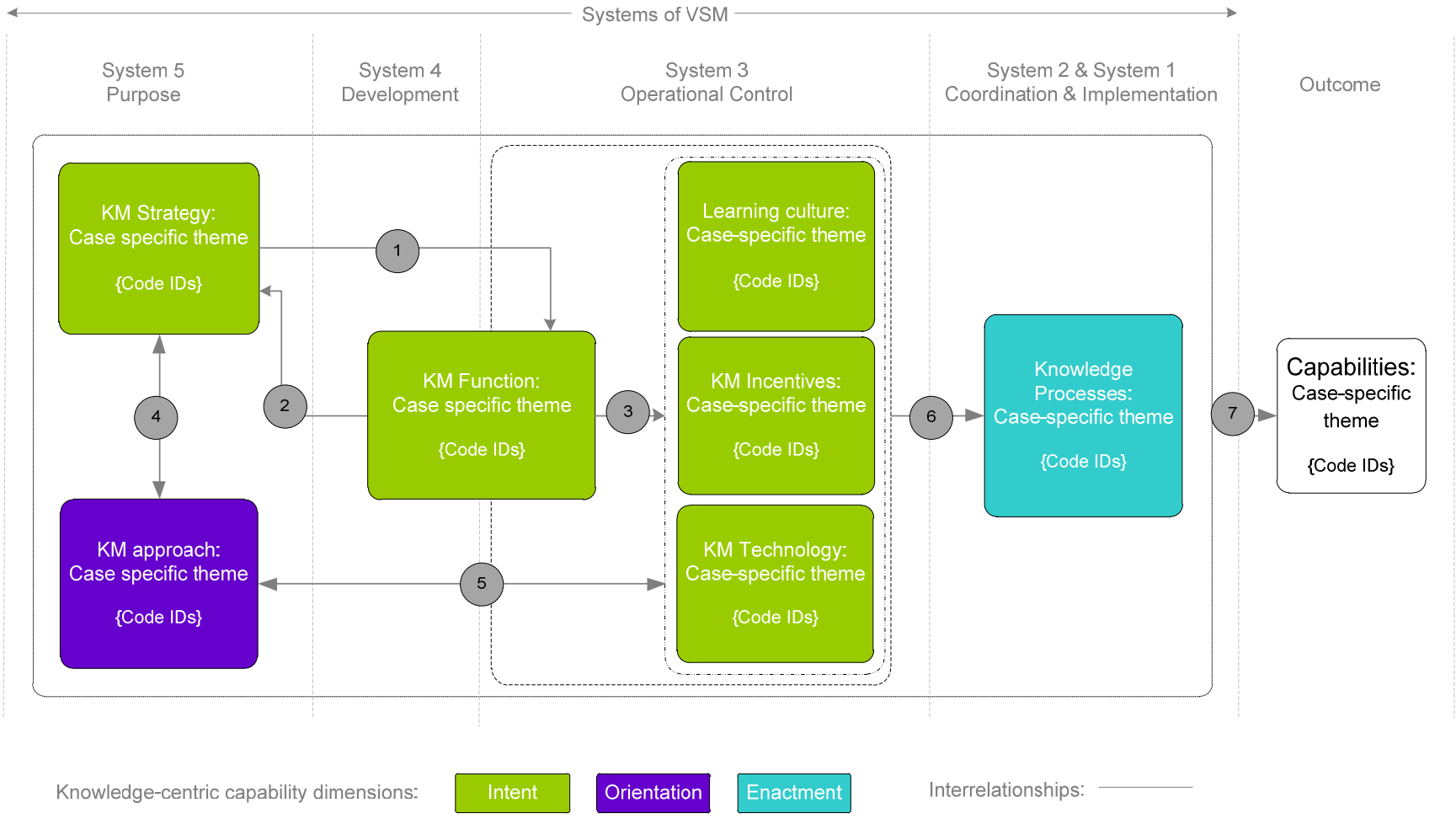


Figure 4.15: Outline of the interrelationships model

Each of the higher-order and case-specific themes were categorised into one of the three dimensions of a knowledge-centric capability. This categorisation is represented by the coloured blocks, with the Intent dimension presented by the green blocks, the Orientation dimension presented by the purple blocks, and the Enactment dimension by the turquoise block. Each theme's Code IDs are included in parenthesis.

The five systems of the VSM, i.e. System 5 – Purpose, System 4 – Development, System 3 – Operational control, System 2 – Coordination and System 1 – Implementation, were mapped to the dimensions of the knowledge-centric capability framework, as originally mapped in §3.6.5.

The interrelationships between the various themes are numbered in the sequence of discussion, and represented by the lines between the coloured blocks. The knowledge-centric capability dimension in which the interrelationship emerged determined the sequence of discussion in the case studies, i.e. first all the interrelationships pertaining to the Intent dimension, then the Orientation dimension and finally the Enactment dimension.

Where the cluster analysis was not concerned with performance outcomes, other than to validate the cluster results, the case studies provided the research with rich data in this regard. The case studies showed that the various archetypes of knowledge-centric capabilities impacted on outcomes differently. This finding further emphasises the value of the case studies to the research. The outcomes are presented in the last column of the interrelationship model under the heading "Outcome'.

4.6.5 Case study composition

The responses to the case study questions were reviewed by the case participants with no major changes suggested. This review by key informants to the case studies further helped to ensure construct validity of the case studies. The individual case studies were composed as separate reports in chapters 7, 8, 9 and 10, each following the same structure. Pseudonyms were used in the case studies if requested by an organisation.

Each case study report started with a reminder in the introduction about which configuration of knowledge-centric capabilities were to be explored in the specific case study. Next an explanation was given about the rationale for selecting the specific organisation as a case study subject. Discussing the rationale for case study selection enhances the external validity of a study (Gibbert, Ruigrok, & Wicki, 2008). A case study background was provided next,

describing the organisational context as well as the status of any knowledge management initiatives within the organisation. The purpose of the case study background was not only to inform the reader about the context, but also acts as a mechanism to further enhance the external validity of the case study (Gibbert, *et al.*, 2008). Next the process followed during data analysis was described, providing an example of how the analysis progressed from the data to coding to theming. The clarification of the data analysis procedure also served to strengthen the construct validity of the case study (Gibbert, *et al.*, 2008).

The discussion of the various themes and interrelationships that emerged from the data analysis comprised the bulk of the case study report. Themes were discussed on the hand of a graphical representation of the theme, as outlined in Figure 4.16.

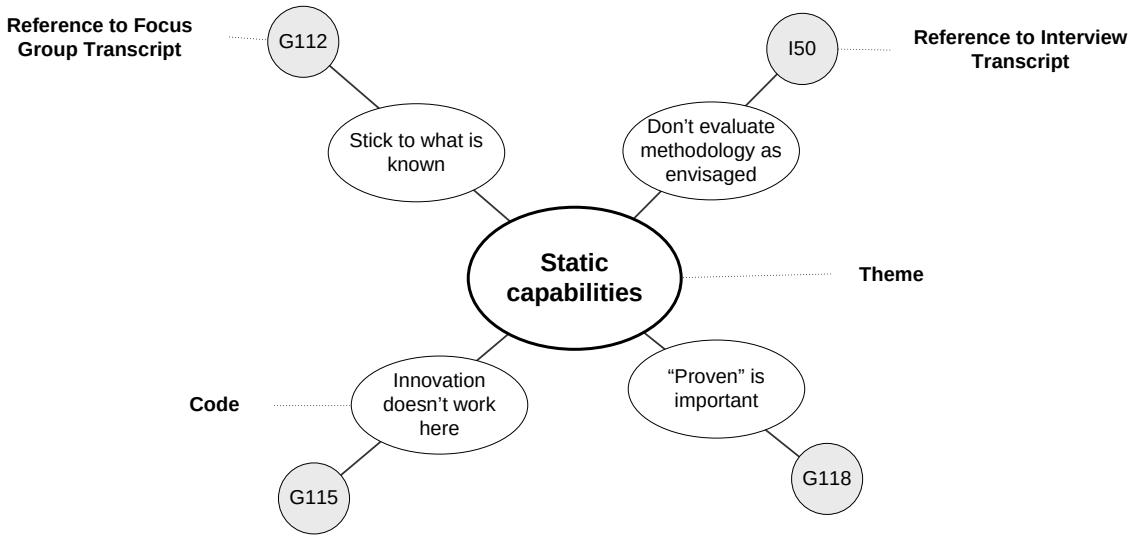


Figure 4.16: Emerging theme outline

The theme, in this case 'Static capabilities', is presented in the centre, while the codes from which the theme was developed are represented in the middle-tier. The outer tier represents references to the actual data from where the codes were developed. The 'G' in the code indicates that the focus group transcript is referenced, while the 'I' indicates that the interview transcript is referenced. The number following the 'G' or 'I' refers to the row number in the transcript.

A discussion of a cross-case analysis was included in §11.6. The cross-case analysis provided an analytical generalisation, meaning that generalisations could be made from the empirical observations to the theory, rather than a population (Eisenhardt, 1989; Yin, 2003).

4.7 Conclusion

Chapter 4 explained the research design and methodology that was followed to address the second and third research questions. Cluster analysis was used to address the second research question, namely what configurations of knowledge-centric capabilities emerge in different organisational contexts. Case studies were used to understand why a specific configuration emerged in a specific context, thereby addressing the third research question.

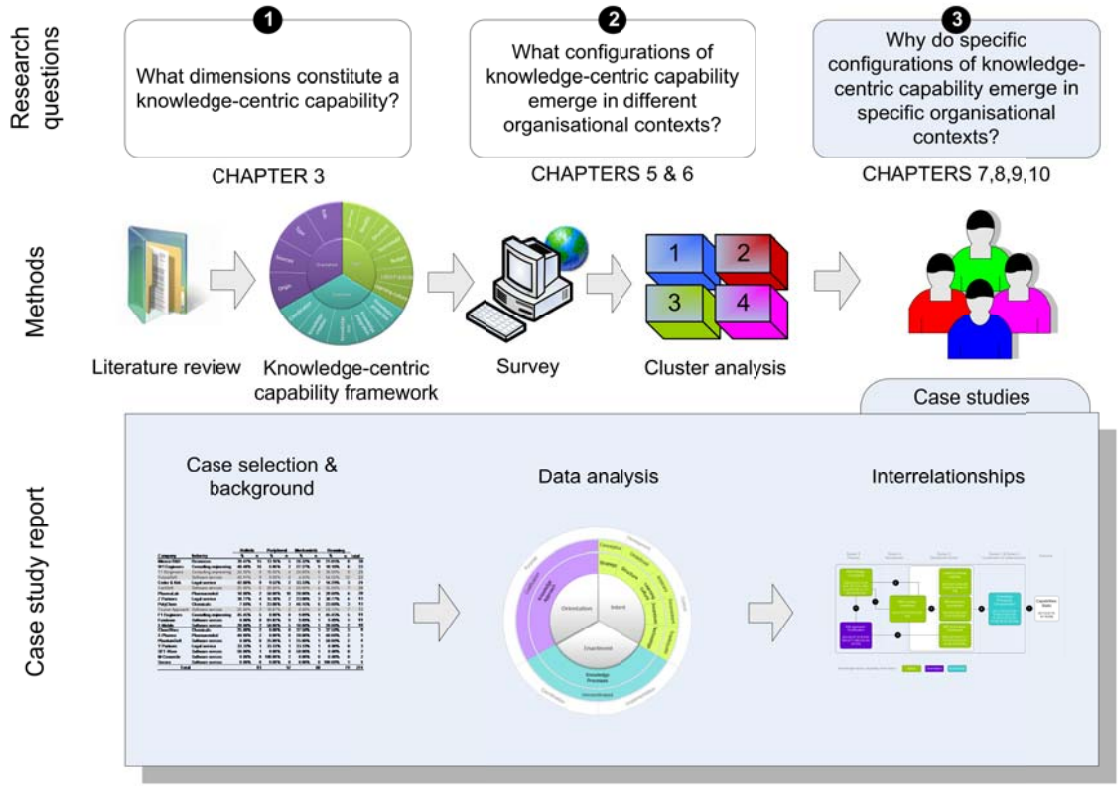


Figure 4.17: From conceptual framework to case study

The progression of the research from defining the knowledge-centric capabilities framework to the case studies are summarised in Figure 4.17.

Chapter 5 next presents the results of the cluster analysis that was performed to address the second research question, namely what configurations of knowledge-centric capability emerge in different organisational contexts?

CHAPTER 5
CLUSTER ANALYSIS

5.1 Introduction

The purpose of the research was to understand what configurations of knowledge-centric capabilities emerge in different organisational contexts, and why these configurations emerge. Different configurations of knowledge-centric capabilities were investigated along three dimensions, namely Intent, Orientation and Enactment.

Cluster analysis can be used to identify natural groups in data, to simplify data or to identify relationships, complementing configurational theory and was therefore used as to identify configurations of knowledge-centric capabilities. A two-stage approach was followed to derive the final cluster solution. During the first stage the candidate number of clusters was determined using a hierarchical cluster analysis algorithm. Subsequently a non-hierarchical clustering method was used in the second stage to produce the final cluster solution. This approach was followed to ensure the reliability of the final cluster solution.

5.2 Candidate number of clusters

5.2.1 Cluster sizes

The complete linkage method was used (as argued in §4.5.6) for the hierarchical cluster analysis to derive a preliminary cluster solution and to select the candidate number of clusters, as illustrated in Figure 5.1.

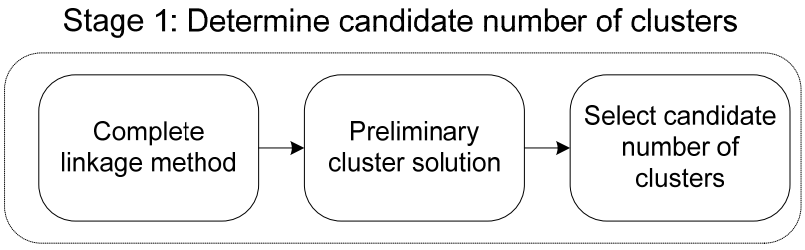


Figure 5.1: The first stage of cluster derivation

Table 5.1 presents the sizes of the cluster solutions ranging from 10 to 2 clusters for the hierarchical cluster analysis.

Table 5.1: Cluster sizes for hierarchical cluster analysis

Cluster ID	Number of members in the *x* cluster solution								
	10	***9***	***8***	***7***	***6***	***5***	***4***	***3***	***2***
1	15	32	32	32	32	32	32	99	217
2	17								
3	17	17	17	17	17	67	67		
4	50	50	50	50	50				
5	67	67	67	67	67	67	118	118	
6	5	5	51	51	51	51			
7	46	46							
8	10	10	10	19	57	57	57	57	57
9	9	9	9						
10	38	38	38	38					

The results show that only two clusters, clusters 6 and 9, were falling below the managerially significant cluster size of ten. It is acceptable to retain small clusters if they merged in the higher ranges of cluster solutions, because they occur in solutions that would not be considered for selection (Hair, *et al.*, 2005: 605). These two clusters were not eliminated, because cluster 6 joined cluster 7 in the eight-cluster solution, and cluster 9 joined cluster 8 in the seven-cluster solution, which were higher ranges of cluster solutions than what would be considered for a final cluster solution. The cluster solutions were therefore deemed to contain clusters of appropriate cluster sizes.

5.2.2 Clustering schedule

Before the candidate number of clusters can be determined, it is also necessary to examine the actual clustering process in order to follow the single outlier identified in §4.5.5, and to identify single-member clusters. The clustering process was examined by studying the agglomeration schedule and dendrogram of the hierarchical cluster analysis.

The agglomeration schedule (called an amalgamation schedule in STATISTICA) presented in Table 5.2 shows the initial and final ten steps of the hierarchical cluster analysis. In the first step of the cluster analysis each case is considered a separate cluster, and cluster 52 and 119 combined at a linkage distance of 1.0220. Because it is the first step, both are single-member clusters, depicted with a zero in the “Step cluster first appears in” column. Neither cluster has appeared in any prior clusters. The newly formed cluster is combined with another cluster in step 8.

Step 8 shows that cluster 52 is combined with cluster 133 at a linkage distance of 1.3350, and that cluster 52 first appeared in step 1 and cluster 133 has not appeared before, indicating it is a single-member cluster. The newly formed cluster is combined with another cluster in step 18.

Table 5.2: Agglomeration schedule of the hierarchical cluster analysis

	Clusters combined			Step cluster first appears		
Step	Cluster 1	Cluster 2	Agglomeration coefficient	Cluster 1	Cluster 2	Next stage in which new cluster appears
1	52	119	1.0220	0	0	8
2	61	67	1.1333	0	0	9
3	21	55	1.1776	0	0	19
4	69	85	1.1981	0	0	9
5	64	83	1.2365	0	0	50
6	15	201	1.2910	0	0	27
7	23	71	1.3182	0	0	47
8	52	133	1.3350	1	0	18
9	61	69	1.3367	2	4	32
10	181	221	1.3367	0	0	22
Intermediate stages 11 to 263 omitted						
264	12	24	3.7411	257	262	270
265	7	29	3.8041	259	255	271
266	2	10	3.8701	258	226	270
267	4	41	3.8890	236	252	268
268	1	4	3.9237	261	267	273
269	6	39	3.9738	264	256	271
270	2	12	4.0150	259	265	272
271	6	7	4.4010	269	265	272
272	2	6	4.8940	270	271	273
273	1	2	6.0115	268	272	0

The initial steps of the hierarchical cluster analysis is centred around joining single-member clusters, with steps 8 and 9 showing clusters formed earlier being combined with other clusters. In the final steps all clusters being combined have resulted from previous combinations, indicating that no single-member clusters exist in the ten to two-cluster solutions.

In §4.5.5 a potential outlier observation was identified. Table 5.3 depicts the agglomeration schedule of the potential outlier, observation 104.

Table 5.3: Agglomeration schedule of potential outlier

Observation 104		
Step	Agglomeration coefficient	Cluster size
175	2.5122	5
217	2.8386	7
254	3.4163	28
260	3.5795	38
263	3.6962	50
269	3.9738	67

The schedule in Table 5.3 shows that observation 104 first combined with a four member cluster in step 175 at a linkage distance of 2.5122, and that in step 269 it formed part of a 67 member cluster. The potential outlier did not end up in a small cluster, indicating that it is not necessary to eliminate the observation.

The dendrogram in Figure 5.2 illustrates the agglomerative nature of the clustering process, from the point where each case formed a cluster on its own on the left hand side of the graph, to the point where all the cases were combined to form one cluster on the right hand side of the graph.

The dendrogram is a useful tool to obtain a visual indication of the clusters that are likely to emerge. From a cursory visual examination of the dendrogram it appears that four or five clusters that provide sufficient heterogeneity may emerge. At the top of the dendrogram the first possible cluster is visible between cases 1 and 185. This cluster corresponds to the cluster with 57 observations (clusters 8, 9 and 10) in Table 5.1. In the middle of the dendrogram a second cluster is visible between cases 185 and 172. This cluster corresponds to the cluster with 118 observations (clusters 5, 6 and 7 in Table 5.1). A third cluster is visible between cases 172 and 196, corresponding with clusters 3 and 4 in Table 5.1 with 67 observations. And at the bottom of the dendrogram a small cluster with 32 observations, corresponding to cluster 1 in Table 5.1, is visible with 32 observations.

No potential outliers, which are single-member clusters that did not join another cluster until very late, are visible on the dendrogram.

A visual examination is however not a robust method to determine the number of clusters. It is necessary to also investigate the percentage change in heterogeneity (Hair, *et al.*, 2005).

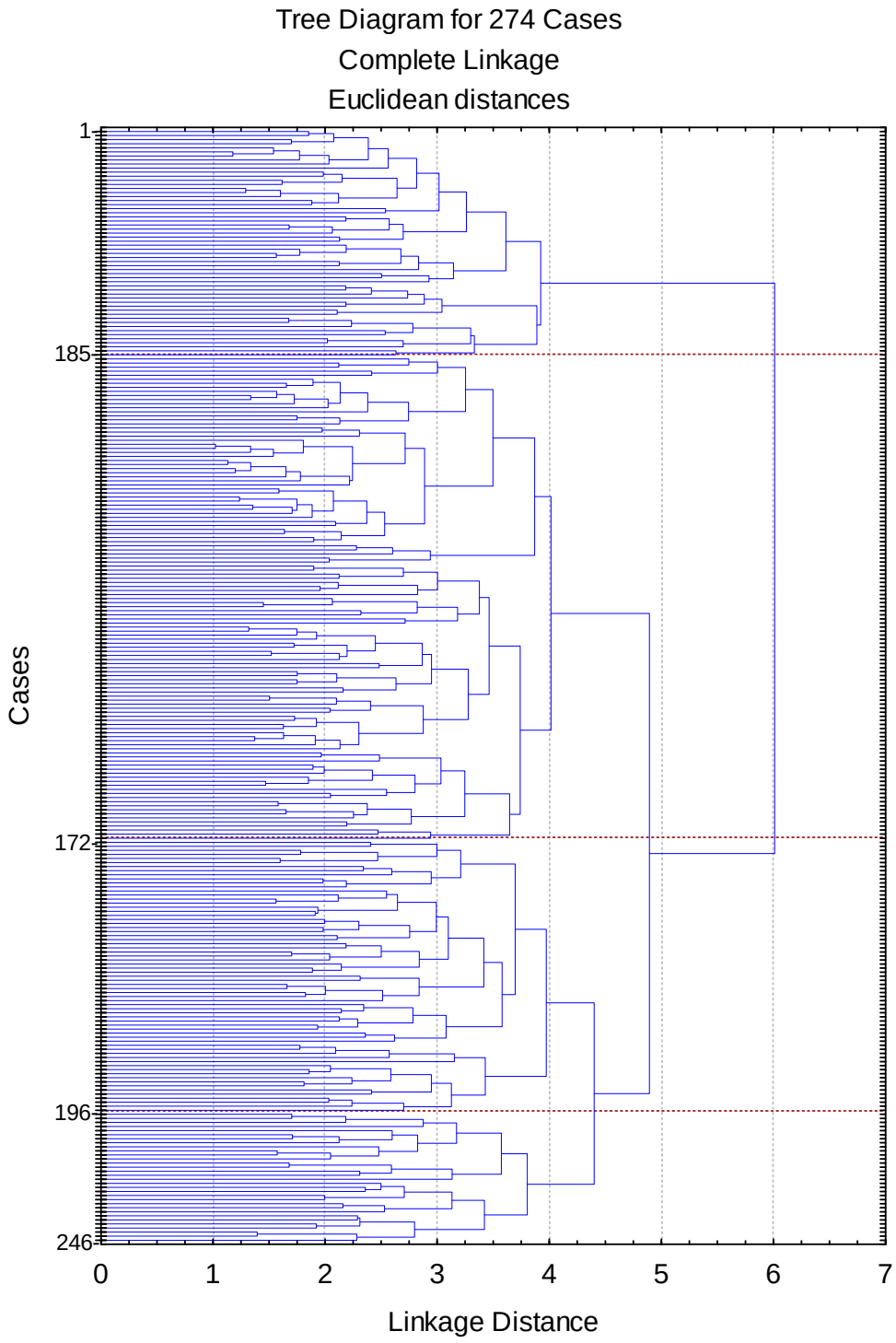


Figure 5.2: Results of the hierarchical clustering

5.2.3 Candidate cluster solution

The *percentage change in heterogeneity* stopping rule (Hair, *et al.*, 2005) was used to determine the candidate number of clusters. The rule uses the agglomeration coefficient to identify large increases in heterogeneity, with small coefficients indicative of fairly homogenous clusters being merged, and large coefficients indicating the joining of two rather different clusters. The rule works on the principle that the cluster solution prior to a large increase in heterogeneity should be selected, as it is indicative of quite different clusters being joined.

Table 5.4: Percentage change in heterogeneity stopping rule

	Number of clusters		Agglomeration coefficient	
Step	Before joining	After joining	Value	Increase to next stage
264	11	10	3.7411	1.7%
265	10	9	3.8041	1.7%
266	9	8	3.8701	0.5%
267	8	7	3.8890	0.9%
268	7	6	3.9237	1.3%
269	6	5	3.9738	1.0%
270	5	4	4.0150	9.6%
271	4	3	4.4010	11.2%
272	3	2	4.8940	22.8%
273	2	1	6.0115	

In Table 5.4 the agglomeration coefficient shows the first marked increase between step 270 and step 271, going from 4.0150 to 4.4010, which is a 9.6 percent increase in the four-cluster solution. Step 271 to 272 shows an 11.2 percent increase from 4.4010 to 4.8940 in the three-cluster solution. The largest increase is the 22.8 percentage change in the agglomeration coefficient from step 272 to 273, from 4.4894 to 6.0115. The increase in heterogeneity in the final step will however always be large without necessarily addressing the research objectives (Hair, *et al.*, 2005).

Figure 5.3 illustrates the significant increase in the agglomeration coefficient (linkage distance) at Step 270, meaning the clusters joined next (Step 271) were markedly different.

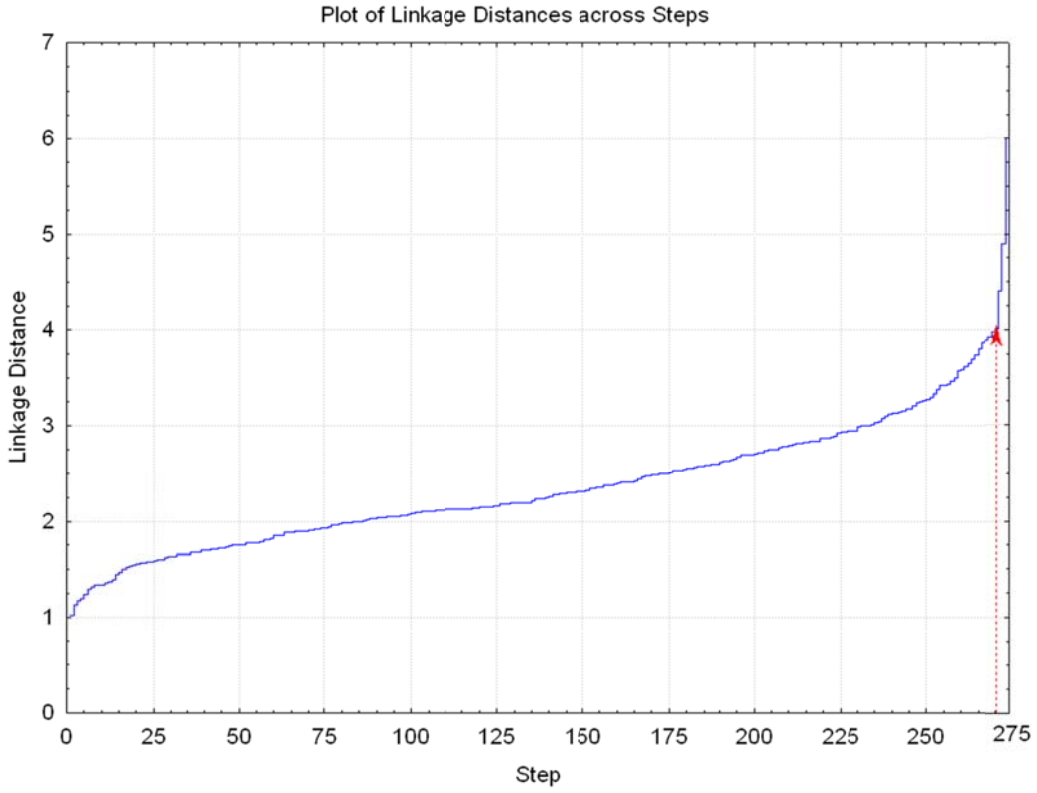


Figure 5.3: Change in agglomeration coefficient

The four-cluster solution was therefore selected as the candidate cluster solution. Table 5.5 presents the cluster membership of the four-cluster solution.

Table 5.5: Four-cluster solution

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
n	*33*	*55*	*67*	*119*
Linkage distance	3.8041	3.9237	3.9738	4.0150
Cluster members	7,36, 269, 19, 11, 48, 118,77, 34, 202, 203, 254,176,272,179, 271, 296, 29, 116, 218, 89, 262, 62, 74, 107, 73, 251, 182, 247, 87, 257, 246	1, 17, 124, 210, 16, 21, 55, 274, 58, 268, 8, 122, 20, 207, 15, 201, 212, 204, 293, 200, 213, 9, 125, 33, 84, 197, 59, 282, 3,22,123, 287, 108, 292, 106, 88, 255, 194, 4, 211, 273, 209, 138, 142, 126, 208, 41, 42, 63, 90, 148, 105, 242, 245, 49, 185	6, 275, 183, 238, 241, 248, 25, 114, 110, 26, 278, 46, 18, 151, 153, 225, 30, 160, 216, 102, 219, 166, 224, 154, 253, 109, 290, 214, 267, 284, 281, 291, 294, 95, 127, 96, 229, 120, 277, 104, 131, 205, 266, 177, 250, 188, 289, 159, 231, 192, 39, 235, 128, 132, 146, 53, 169, 178, 174, 189, 195, 191, 193, 100, 144, 237, 196	2, 80, 228, 130, 226, 37, 186, 187, 38, 181, 221, 121, 112, 45, 79, 162, 220, 14, 198, 227, 50, 52, 119, 133, 60, 61, 67, 69, 85, 97, 135, 164, 28, 57, 64, 83, 82, 276, 129, 72, 32, 47, 68, 155, 217, 283, 10, 230, 54, 51, 115, 12, 40, 13, 279, 65, 81, 244, 111, 66, 103, 143, 141, 147, 91, 260, 23, 71, 70, 139, 117, 265, 145, 286, 288, 158, 280, 76, 101, 134, 137, 170, 259, 31, 184, 56, 35, 44, 92, 222, 215, 249, 136, 168, 252, 163, 236, 24, 264, 78, 43, 157, 165, 99, 239, 240, 75, 270, 285, 27, 243, 86, 140, 161, 173, 258, 156, 171, 172

In the four-cluster solution, Cluster 1 forms at a linkage distance of 3.8041 with 33 members. Cluster 2 forms at a linkage distance of 3.9237 with 55 members. Cluster 3 forms at a linkage distance of 3.9738 with 67 members and cluster 4 at 4.0150 with 119 members. The four-cluster solution linkage distance is illustrated in the enlarged dendrogram illustrated below in Figure 5.4.

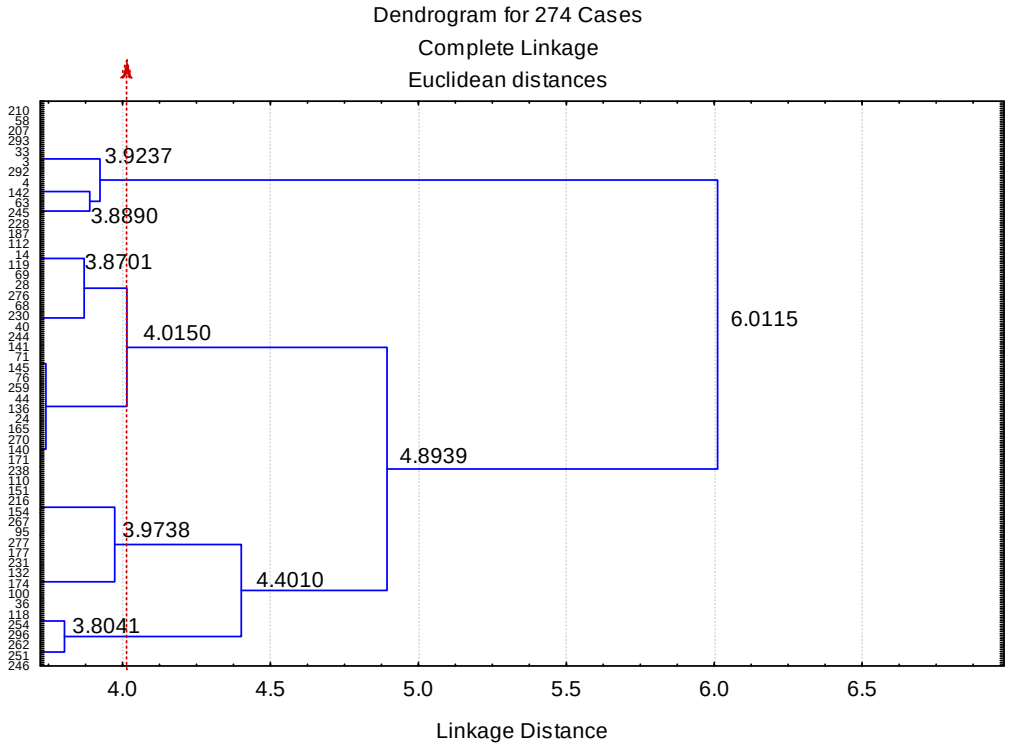


Figure 5.4: Dendrogram of hierarchical cluster analysis

The hierarchical cluster analysis was used to evaluate a vast range of cluster solutions in a comprehensive manner and has shown that a four-cluster solution provides sufficient heterogeneity to investigate the research question of what knowledge management capabilities emerge in different organisational context.

The hierarchical clustering algorithm however did not allow reassignment of observations, meaning that once two clusters were joined, they could not be separated or reassigned to more similar clusters discovered later in the analysis process. Non-hierarchical cluster analysis therefore had to be used to derive the optimum cluster solution with minimum heterogeneity within clusters.

5.3 Final cluster solution

5.3.1 Non-hierarchical cluster analysis

The k-means algorithm was used as a non-hierarchical method to classify observations into a pre-specified number of clusters, with the goal of minimising within-cluster heterogeneity and maximising between-cluster heterogeneity. The candidate cluster solution was used to determine the number of clusters, with their cluster means as the initial cluster centres of the non-hierarchical cluster analysis, as presented in Table 5.6.

Table 5.6: Means of the candidate cluster solution

	Candidate clusters			
	Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**
n	*33*	*55*	*67*	*119*
Coefficient	3.8041	3.9237	3.9738	4.0150
Means	0.6876	0.5562	0.6076	0.7848

Using this input, the non-hierarchical cluster analysis generated the optimum cluster solution in four iterations. A notable difference between the hierarchical and non-hierarchical solutions was the distribution of cluster sizes. The non-hierarchical method produced cluster sizes of 83, 52, 60 and 79 observations respectively. The more even distribution of observations among the clusters could be due to the ability of non-hierarchical cluster analysis to reassign observations between clusters through a number of iterations (Hair, *et al.*, 2005).

The cluster profiles presented in Figure 5.5 illustrate the differences between the clusters across the standardised clustering variables. From the profile analysis distinct differences between a large number of variables are visible. For example, variable KI_01 in Table 5.7 determined the presence of a formal knowledge management strategy in an organisation. Cluster 1 had the highest cluster means of 0.86 and Cluster 2 the lowest of 0.10. Cluster 3 was in the middle with 0.57 and Cluster 4 a bit lower at 0.38.

Table 5.7: Example of differences among clusters

Variable	Description	Cluster 1	Cluster 2	Cluster 3	Cluster 4
KI_01	Does your organisation have a formal knowledge management strategy?	0.86	0.10	0.57	0.38

Note: The scale used was 1 = *yes* and 0 = *no.*

The distinct difference in the variable makes it a possible contributor to the difference between the clusters.

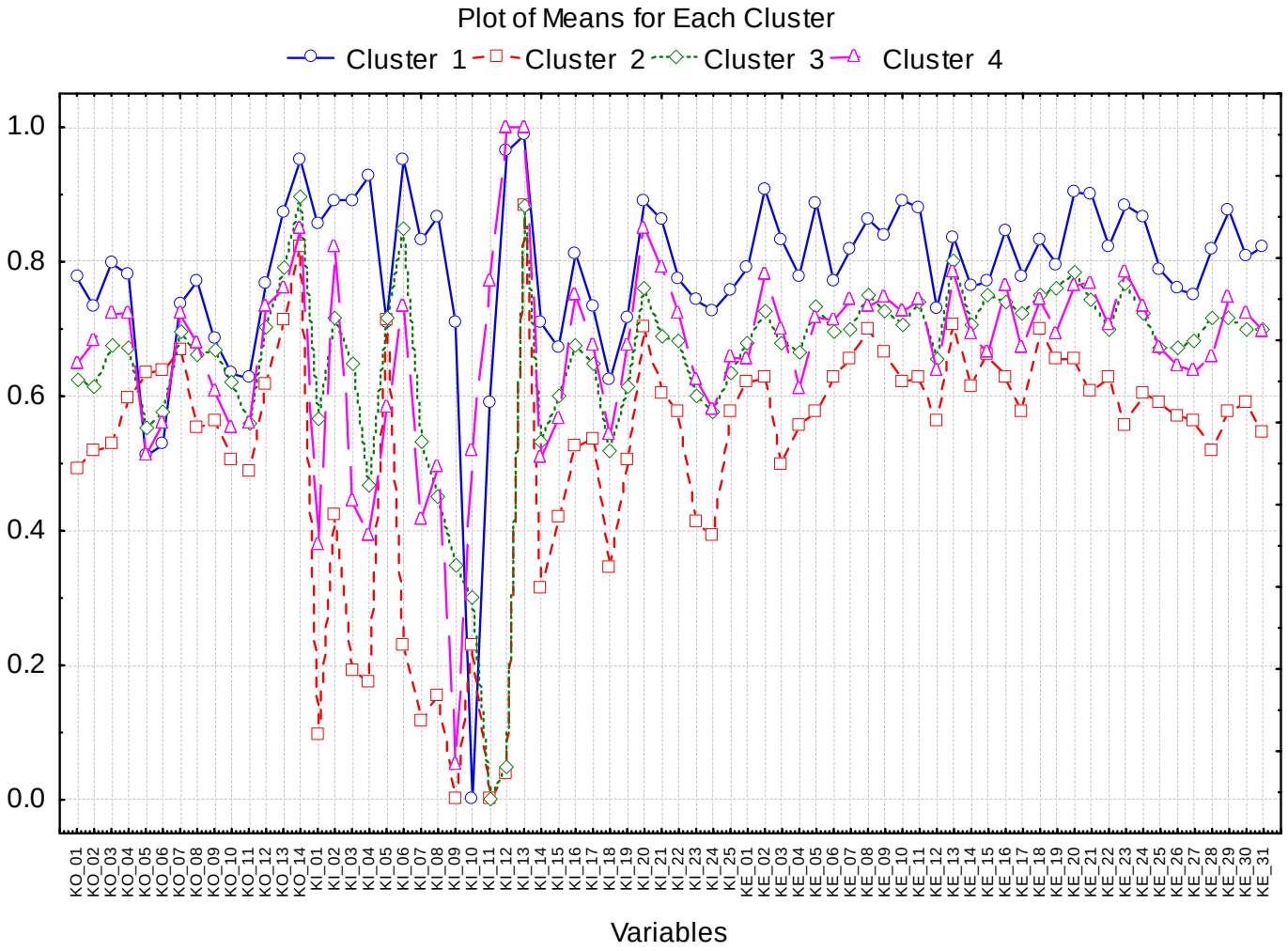


Figure 5.5: Profile analysis of standardised cluster variables

It is also clear from the profile analysis that each cluster has a distinct profile. Because cluster analysis will group any data into clusters, regardless of whether any natural groupings exist in the data, the cluster solution had to be validated.

5.3.2 Validating the cluster solution

The cluster solution was validated in two steps. First the clusters were assessed for predictive validity on additional outcome measures that are indicative of the result of different knowledge management capabilities. Second the cluster solution was assessed by comparing the results of different cluster methods applied to the same data set.

Predictive validity was assessed using a variable that shows a theoretically based relationship to the clustering variables, but was not included in the cluster solution. In the questionnaire ten variables were included to measure effectiveness, as presented in Table 5.8. The question can be viewed in Appendix B, Question 28.

Table 5.8: Measures of effectiveness

Over the past two years, how has your organisation's abilities to perform the following activities evolved?

Variable	Activity
EF_01	Inventing new products or services
EF_02	Identifying new business opportunities
EF_03	Coordinating the development efforts of different units
EF_04	Anticipating potential market opportunities for new products and services
EF_05	Commercialising innovations
EF_06	Adapting to changes in the organisation's external environment
EF_07	Anticipating surprises and crisis
EF_08	Decreasing market response times
EF_09	Avoiding overlap in the development of organisaitonal initiatives
EF_10	Streamlining our internal processes

Note: The scale used was 1 = *significantly deteriorated* ; 2 = *deteriorated slightly;* 3 = *remained unchanged;* 4 = *improved slightly;* 5 = *significantly improved.*

The theoretical based assumption used in assessing criterion validity is that organisations with formal knowledge management strategies will improve in their ability to perform the activities listed in Table 5.8.

Given this relationship, significant differences in these variables should occur across the clusters and if they occur, it can be concluded that the clusters do depict groups that have predictive validity (Hair, *et al.*, 2005). Each effectiveness measure was examined for differences across the clusters in Table 5.9.

Table 5.9: Assessing criterion validity

	Cluster means									
Cluster	EF_01	EF_02	EF_03	EF_04	EF_05	EF_06	EF_07	EF_08	EF_09	EF_10
1	0.8193	0.8482	0.8313	0.8361	0.7614	0.8241	0.7518	0.7446	0.7590	0.8193
2	0.6615	0.7115	0.6462	0.6962	0.6269	0.6654	0.6038	0.5923	0.6038	0.6500
3	0.7333	0.7967	0.7500	0.7667	0.7100	0.7567	0.7233	0.6833	0.7033	0.7267
4	0.7646	0.8025	0.7595	0.7392	0.6785	0.7696	0.7013	0.6734	0.6785	0.7519
	Statistical significance of Criterion Variables									
F Value	14.5030	9.9207	17.1750	11.0510	8.6566	12.9800	11.4610	12.2620	16.2750	11.1650
Significance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The F values show that the cluster means for all effectiveness variables are significantly different, with $p < 0.01$ in all instances. Effectiveness measures are expected to vary in relation to the clustering variables with a positive relationship between having a formal knowledge management strategy and effectiveness.

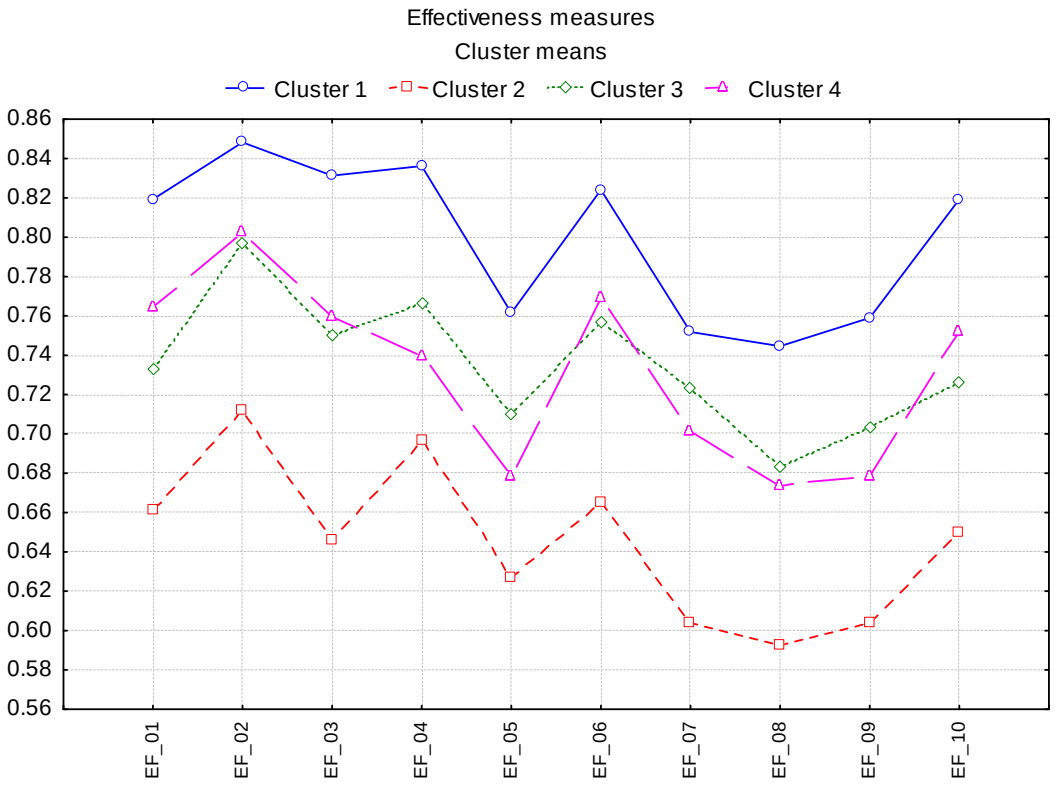


Figure 5.6: Cluster means for effectiveness measures

Figure 5.6 illustrates that the effectiveness of Cluster 1 which has a formal knowledge management strategy was rated as having significantly improved over a 2-year period. Cluster 3 and Cluster 4's effectiveness were rated as having slightly improved over a 2-year period. The effectiveness of Cluster 2, which doesn't have a formal knowledge management

strategy, was rated as having remained unchanged over a 2-year period. These findings support the assumption made earlier and a high level of criterion validity.

The second validity test for stability of the cluster solution compared the results of the initial hierarchical cluster analysis with the results of the non-hierarchical cluster analysis to determine the degree of consistency between the two solutions.

Table 5.10: Cross-tabulation of hierarchical and non-hierarchical cluster solutions

		K-means				
	Complete linkage	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Total**
Count	Cluster 1	0	6	24	2	32
Percentage		0%	19%	75%	6%	
Count	Cluster 2	0	44	10	2	56
Percentage		0%	79%	18%	4%	
Count	Cluster 3	2	2	7	56	67
Percentage		3%	3%	10%	84%	
Count	Cluster 4	81	0	19	19	119
Percentage		68%	0%	16%	16%	
Total		**83**	**52**	**60**	**79**	**274**

A cross-tabulation (Table 5.10) of the cluster solutions shows that more than two-thirds of each cluster is in comparable clusters in each solution, which is deemed an acceptable level of consistency (Hair, *et al.*, 2005). A second non-hierarchical cluster analysis was also performed, with the initial cluster centres selected from the hierarchical cluster solution. A cross-tabulation (Table 5.11) of the results shows that all the members of each cluster are present in comparable clusters in each solution.

Table 5.11: Cross-tabulation of non-hierarchical cluster solutions

		Cluster centres at constant intervals				
	Cluster centres from hierarchical solution	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Total**
Count	Cluster 1	0	0	60	0	60
Percentage		0%	0%	100%	0%	
Count	Cluster 2	83	0	0	0	83
Percentage		100%	0%	0%	0%	
Count	Cluster 3	0	0	0	79	79
Percentage		0%	0%	0%	100%	
Count	Cluster 4	0	52	0	0	52
Percentage		0%	100%	0%	0%	
Total		**83**	**52**	**60**	**79**	**274**

The stability of the results between the hierarchical cluster solution and non-hierarchical cluster solution, and the specified cluster centres and interval cluster centres, is an indication that true differences do exist among organisations in terms of their knowledge-centric capabilities and that the structure depicted in the cluster analysis is supported empirically.

5.4 Conclusion

Chapter 5 presented the results of the cluster analysis that was performed to identify configurations of knowledge-centric capabilities. Using a two-staged approach, a stable four-cluster solution was produced, which means that four configurations of knowledge-centric capabilities have emerged from the survey data.

In order to defined and label the clusters, Chapter 6 explores the characteristics on which they were clustered.

CHAPTER 6
CONFIGURATIONS OF KNOWLEDGE-CENTRIC CAPABILITIES

6.1 Introduction

The final cluster solution consisted of four clusters and has been shown to be stable. The purpose of Chapter 6 is to complete the cluster analysis process by interpreting and labelling the clusters in terms of the characteristics on which they were clustered. The labelling process is accomplished by comparing the mean scores of the clusters on the clustering variables. The clusters are discussed in detail as archetypes of different configurations of knowledge-centric capabilities in Chapters 7, 8, 9 and 10.

By interpreting and labelling the clusters, Chapter 6 thus addresses the second research question, namely given the dimensions identified in the first research question, what configurations of knowledge management capabilities emerged in different organisational contexts. The second research questions builds on the first, and therefore the discussion in this chapter proceeds along the three dimensions of Knowledge Intent, Knowledge Orientation and Knowledge Enactment as defined by the first research question.

6.2 Knowledge intent

The knowledge intent dimension focused on whether an organisation displays the intent to manage knowledge as a strategic resource and included sub-dimensions such as strategy, benefits, structure, technology, HRM practices and learning culture.

The mean score of each cluster for the variables in the Knowledge Intent dimension is presented in Table 6.1. All the Knowledge Intent clustering variables were significantly different at the 0.05 significance level, except variable KI_05 (p = 0.23), which measured the presence of a formal research function within an organisation. This can probably be explained by the fact that the sample used the Eurostat (Amil, *et al.*, 2007) classification of knowledge-intensive industries, which is based on the percentage of total budget that organisations in various industries spend on research and development. It can therefore be expected that organisations included in the sample will have some form of a formal research function.

The cluster profiles of the knowledge intent dimension presented in Figure 6.1 show a clear distinction between the four clusters on all other variables. Variable KI_09 and KI_ 10 are conceptually related. KI_09 indicates whether an organisation has dedicated budgets for

knowledge management activities. KI_10 is an indicator of whether organisations that do not have dedicated budgets for knowledge management activities, expected to have such a budget within the next 24 months. Cluster 1 seems to have the strongest intent to manage knowledge as a strategic resource, consistently measuring high on all the variables. Cluster 2 seems to have the weakest intent to manage knowledge as a strategic resource, consistently measuring the lowest on most variables.

Table 6.1: Analysis of the differences among four clusters on Knowledge Intent

Variable	*F*	*p*	Cluster 1 *n = 83*	Cluster 2 *n = 52*	Cluster 3 *n = 60*	Cluster 4 *n = 79*
KI_01*	38.042	0.000	0.86	0.10	0.57	0.38
KI_02*	15.598	0.000	0.89	0.42	0.72	0.82
KI_03*	32.250	0.000	0.89	0.19	0.65	0.44
KI_04*	41.345	0.000	0.93	0.17	0.47	0.39
KI_05*	1.460	0.226	0.71	0.71	0.72	0.58
KI_06*	44.641	0.000	0.95	0.23	0.85	0.73
KI_07*	30.600	0.000	0.83	0.12	0.53	0.42
KI_08*	30.578	0.000	0.87	0.15	0.45	0.49
KI_09*	61.918	0.000	0.71	0.00	0.35	0.05
KI_10*	23.933	0.000	0.00	0.23	0.30	0.52
KI_11*	84.429	0.000	0.59	0.00	0.00	0.77
KI_12*	683.101	0.000	0.96	0.04	0.05	1.00
KI_13*	5.811	0.001	0.99	0.88	0.88	1.00
KI_14**	49.849	0.000	0.71	0.32	0.53	0.51
KI_15**	15.522	0.000	0.67	0.42	0.60	0.57
KI_16**	25.589	0.000	0.81	0.53	0.68	0.75
KI_17**	10.147	0.000	0.73	0.53	0.65	0.68
KI_18**	23.882	0.000	0.62	0.35	0.52	0.54
KI_19**	12.387	0.000	0.72	0.50	0.61	0.68
KI_20**	16.011	0.000	0.89	0.70	0.76	0.85
KI_21**	21.344	0.000	0.86	0.60	0.69	0.79
KI_22**	17.439	0.000	0.77	0.58	0.68	0.72
KI_23**	49.263	0.000	0.74	0.41	0.60	0.63
KI_24**	50.826	0.000	0.73	0.39	0.58	0.58
KI_25**	11.274	0.000	0.76	0.58	0.63	0.66

Note: Standardised values are displayed.
* The following scale was used: 1 = *yes* and 0 = *no.*
** The following scale was used: 5 = *continuously;* 4 = *often;* 3 = *occasionally;* 2 = *seldom;* 1 = *never.*

The variables with the most significant variance were KI_12 (*F = 683.*101) which indicated whether organisations have some form of incentive for creating, sharing and using knowledge, and KI_11 (*F = 84.*429) which indicated whether knowledge usage was

considered in appraisal interviews and salary negotiations. Clusters 4 ($\bar{X}$ = *1.00*) measured the highest on KI_12 with Cluster 1 ($\bar{X}$ = *0.96*) second highest. Cluster 2 ($\bar{X}$ = *0.04*) measured the lowest on KI_12 with Cluster 3 ($\bar{X}$ = *0.05*) only marginally higher. Cluster 4 ($\bar{X}$ = *0.77*) also measured the highest on KI_11 with Cluster 1 ($\bar{X}$ = *0.59*) again second highest. Cluster 2 ($\bar{X}$ = *0.00*) and Cluster 3 ($\bar{X}$ = *0.00*) measured the lowest, indicating that knowledge creation and usage is not considered during appraisal interviews or salary negotiations at all.

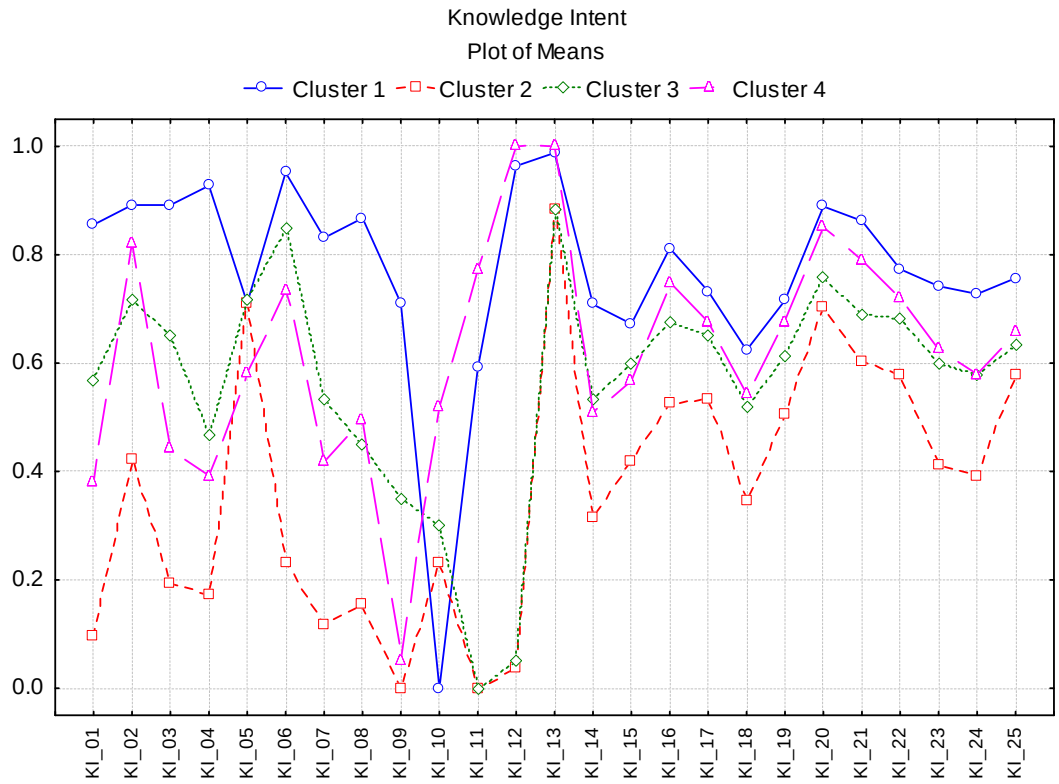


Figure 6.1: Profile analysis of knowledge intent dimension

Most other variables displayed highly significant variances with Cluster 1 measuring the highest, Cluster 2 measuring the lowest, and Clusters 3 and 4 measuring in the middle. There were some exceptions where Cluster 4 measured notably lower on variables with highly significant variance than Cluster 3. One example is KI_09 (*F = 61.918*), which indicated that Cluster 1 has dedicated budgets for knowledge management activities while Cluster 2 and Cluster 4 do not have dedicated budgets. KI_06 (*F = 44.641*) also indicated that there was a stronger view in Cluster 3 ($\bar{X}$ = *0.85*) than in Cluster 4 ($\bar{X}$ = *0.73*) that the technology used in an organisation supports knowledge management. KI_01 (*F = 38.042*) indicated that there was a strong view in Cluster 4 that the organisation does not have a formal knowledge

management strategy ($\bar{X} = 0.38$). KI_03 ($F = 32.250$) also indicated a distinct view in Cluster 4 that the organisation does not have a formal knowledge management function ($\bar{X} = 0.44$).

A visual analysis of the knowledge intent dimension was performed by using a colour scale to represent the values in the different clusters. The heat maps were used to identify higher-level characteristics of the clusters, which could ultimately be used to derive a name for each cluster. The variables measuring knowledge intent activities, KI_01 to KI_13, assessed whether activities are performed or not. The resulting heat map for variables KI_01 to KI_13 is presented in Figure 6.2. In interpreting the heat map, higher mean scores were taken as an indication of a more purposeful intent, while lower mean scores were interpreted as an indication of a more tentative intent, or no intent, depending on the value.

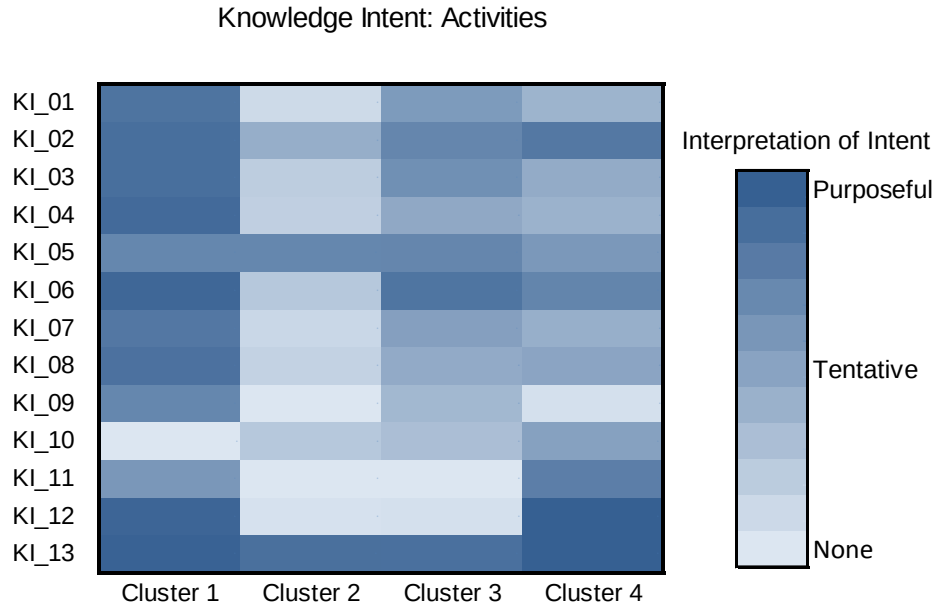


Figure 6.2: Heat map of Knowledge Intent activities

The overall darker shade of Cluster 1's heat map illustrates a more purposeful and balanced intent to manage knowledge as a strategic resource. The only light shade is at KI_10 which, as discussed earlier, when interpreted with KI_09 is an indicator of a dedicated budget for knowledge management activities. Cluster 2's heat map illustrates a very weak, almost insignificant intent to manage knowledge as a strategic resource. Cluster 3's intent is described as tentative, with most variables represented by a mid-tone. The light tones at KI_11 and KI_12 indicates that Cluster 3 does not have any mechanisms in place to encourage the creation, sharing or usage of knowledge. Cluster 4's intent is also described as tentative with most variables represented by a mid-tone. The exception is KI_09 which

indicates the absence of a dedicated budget for knowledge management activities, but read with KI_10 indicates that such a budget may be imminent.

The heat map of variables KI_14 to KI_25, presented in Figure 6.3, examines the learning culture sub-dimension of Knowledge Intent, assessing how frequent certain learning activities occur.

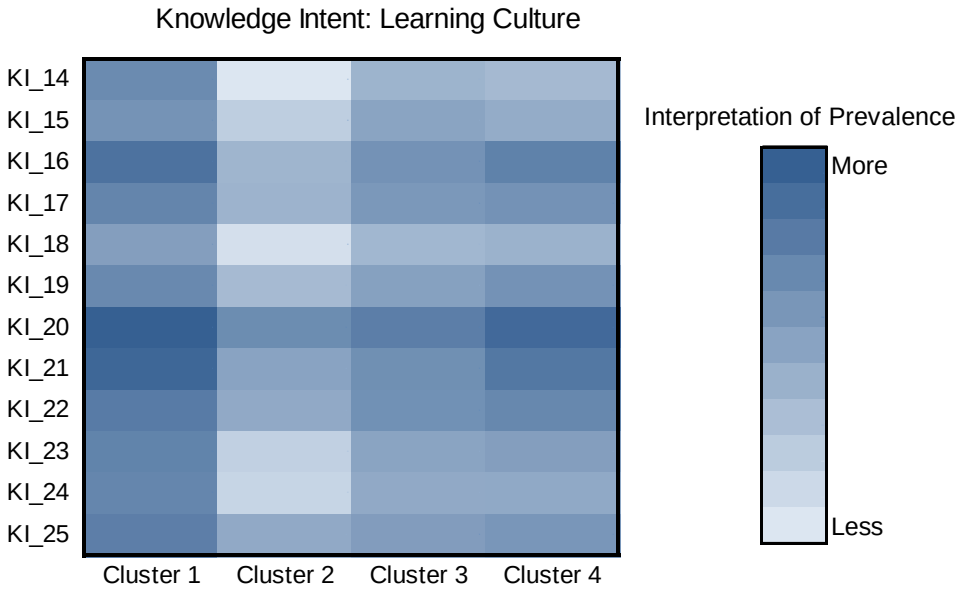


Figure 6.3: Heat map of Knowledge Intent culture

In interpreting the heat map, higher mean scores were taken as an indication of a greater prevalence of the relevant learning culture activity, while lower mean scores were interpreted as learning culture activities that are less prevalent. Cluster 1 seems to have the most prevalent learning culture, while Cluster 2 does not seem to have a prevalent learning culture. Cluster 4 seems to have a slightly more prevalent learning culture than Cluster 3.

6.3 Knowledge orientation

The knowledge orientation dimension focussed on how an organisation views knowledge, in terms of types of knowledge, the origin of knowledge, the role of knowledge and sources of knowledge.

The mean score of each of the four clusters for the variables in the knowledge orientation dimension is presented in Table 6.2. All the knowledge orientation clustering variables were significantly different at the 0.05 significance level, except variable KO_07 ($p = 0.19$) which measured the degree to which work flows in a reciprocal manner in an organisation.

Work appears to mostly flow in a back-and-forth manner in all clusters. In Cluster 1 however work is also often performed in a collaborative manner as indicated by KO_08, while in the other clusters it was rated as seldom or occasional.

Table 6.2: Analysis of the differences among four clusters on knowledge orientation

Variable	*F*	*p*	Cluster 1 *n = 83*	Cluster 2 *n = 52*	Cluster 3 *n = 60*	Cluster 4 *n = 79*
KO_01*	23.088	0.000	0.78	0.49	0.62	0.65
KO_02*	16.949	0.000	0.73	0.52	0.61	0.68
KO_03*	22.222	0.000	0.80	0.53	0.68	0.72
KO_04*	11.613	0.000	0.78	0.60	0.67	0.72
KO_05**	4.985	0.002	0.51	0.63	0.55	0.51
KO_06**	3.906	0.009	0.53	0.64	0.58	0.56
KO_07**	1.619	0.185	0.74	0.67	0.70	0.72
KO_08**	12.438	0.000	0.77	0.55	0.66	0.68
KO_09**	4.288	0.006	0.68	0.56	0.67	0.61
KO_10**	5.444	0.001	0.63	0.50	0.62	0.55
KO_11**	5.813	0.001	0.63	0.49	0.56	0.56
KO_12**	6.469	0.000	0.77	0.62	0.70	0.73
KO_13**	10.389	0.000	0.87	0.71	0.79	0.76
KO_14**	9.894	0.000	0.95	0.82	0.90	0.85

Note: Standardised values are displayed.
* The following scale was used: 5 = critical; 4 = significant; 3 = average; 2 = marginal and 1 = no contribution.
** The following scale was used: 5 = continuously; 4 = often; 3 = occasionally; 2 = seldom; 1 = never.

The cluster profiles of the knowledge orientation dimension presented in Figure 6.4 shows a clear distinction between the four clusters. The most notable differences appear to be KO_01 (*F = 23.088*) indicating that members of Cluster 1 consider the capturing of expert knowledge as a significant contributor to their organisation's ability to compete, while members of Cluster 3 and Cluster 4 considered it as an average contributor and members of Cluster 2 a marginal contributor.

KO_03 (*F = 22.222*) indicated that members of Cluster 1 consider identifying and sharing best practices as a significant contributor to the organisation's ability to compete, while members of Cluster 3 and Cluster 4 considered it to be more than an average contributor and members of Cluster 2 considered it to be a more than marginal contributor.

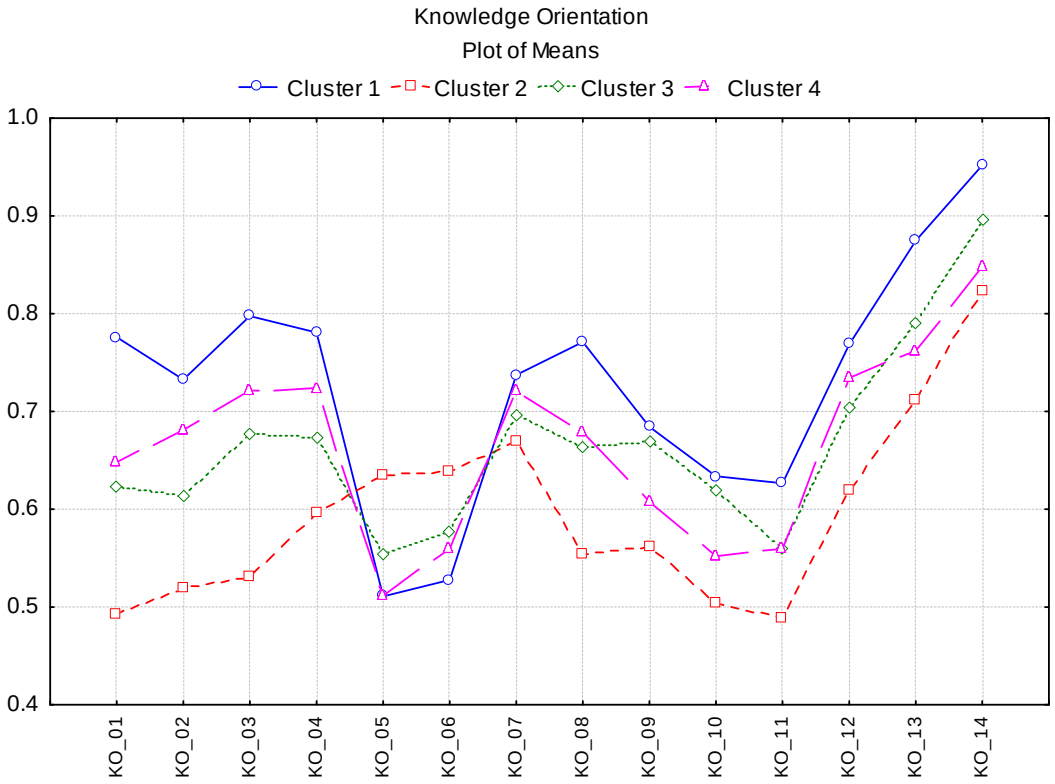


Figure 6.4: Profile analysis of knowledge orientation dimension

KO_02 (*F = 16.949*) indicated that members of Cluster 1 considers providing experiences for employees to build relationships over time a slightly less than significant contributor to their organisation's ability to compete. Members of Cluster 2 viewed it as a more than average contributor, while members of Cluster 3 viewed it as an average contributor. Members of Cluster 4 viewed it as a more than average contributor to their organisation's ability to compete. KO_04 (*F = 11.6128*) indicated that members of Cluster 1 view providing opportunities to employees to develop new skills as a significant contributor to their organisation's ability to compete, while members of Cluster 2 view it as an average contributor. Members of Clusters 3 and 4 view it as a more than average contributor. The other significant variance occurred at KO_08 (*F = 12.438*) where members of Cluster 1 indicated that work is often performed in a collaborative manner, while members of Clusters 2, 3 and 4 indicated that work is only occasionally performed in a collaborative manner. The high magnitude of the F values of variables KO_01 to KO_05 show that how organisations view different types of knowledge and the prevalence of collaboration are key differentiators in the knowledge orientation dimension.

The visual analysis of the knowledge orientation dimension was performed separately on knowledge types, origin and sources.

The results of variables KO_01 to KO_04, representing knowledge types, are presented in Figure 6.5. The variables assessed the perceived contribution of different types of knowledge to an organisation's ability to compete. In interpreting the results, higher mean scores were interpreted as indicators of a significant contribution to an organisation's ability to compete, while lower mean scores were taken as indicators of average of marginal contributions.

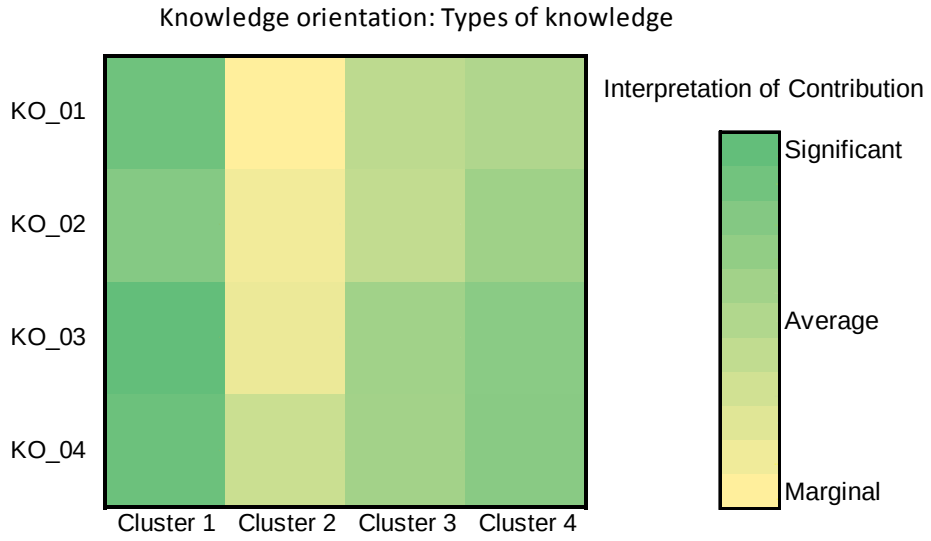


Figure 6.5: Heat map of knowledge types

The overall darker tones of Cluster 1 illustrates that all knowledge types are viewed as significant contributors to an organisation's ability to compete. The overall lighter tones of Cluster 2 illustrates that different types of knowledge are only viewed as marginal contributors to an organisation's ability to compete. Cluster 3 and cluster 4's mid-tones illustrate that different types of knowledge are considered average contributors to an organisation's ability to compete. It therefore seems that only Cluster 1 views different types of knowledge as a strategic resource.

Variables KO_05 to KO_08 represent the origin of knowledge by examining the flow of work. In KO_05 employees work independently and work doesn't flow between them. In KO_06 work is performed in a sequential manner and KO_07 represents work flowing in a reciprocal manner. In KO_08, employees work in a collaborative manner to complete the work at the same time.

From the heat map presented in Figure 6.6 it is clear that in Cluster 1 work is mostly completed in a collaborative and often in a reciprocal manner, highlighting the prevalence of collective knowledge and the importance of knowledge management coordination mechanisms. In Cluster 2 work mostly flows in a reciprocal manner, highlighting the relative importance of collective knowledge. It seems though that employees also sometimes work independently and that work sometimes flow sequentially, highlighting an additional orientation towards individual knowledge. In Cluster 2 work is seldom completed in a collaborative manner.

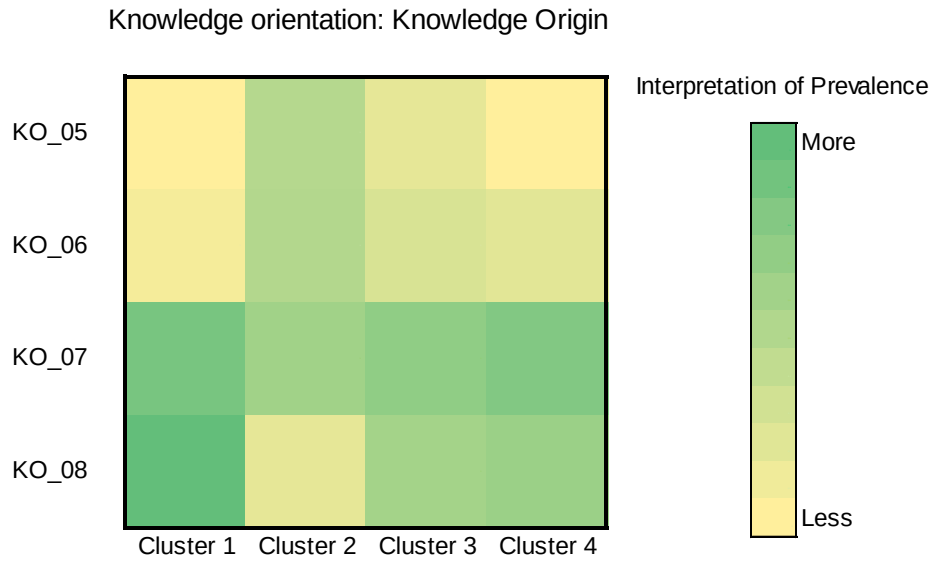


Figure 6.6: Heat map of knowledge origin

In Clusters 3 and 4 work mostly flows in a reciprocal manner and sometimes work is performed collaboratively. In all the clusters collective knowledge is fairly prevalent, while in Cluster 2 individual knowledge also seem to enjoy some prominence.

The results of variables KO_09 to KO_14, measuring the prevalence of external sources of knowledge, are presented in Figure 6.7. Greater usage of external sources of knowledge creates more variety in an organisation which stimulates the creation of knowledge.

All four clusters seem to be more reliant on external sources of explicit knowledge, and less reliant on external sources of tacit knowledge. Cluster 1 seems to be somewhat more reliant on external sources of tacit knowledge than the other clusters, particularly knowledge from industry and professional bodies. Cluster 3 also seems to have some reliance on universities (KO_09) and private research institute (KO_10), but little reliance on management

consultancies. Cluster 2 seems to be least reliant on external knowledge sources. Cluster 4 seems to be reliant on external sources of explicit knowledge and tacit knowledge in the form of industry and professional bodies. All four clusters rely heavily on databases searches and the Internet as an external source of knowledge.

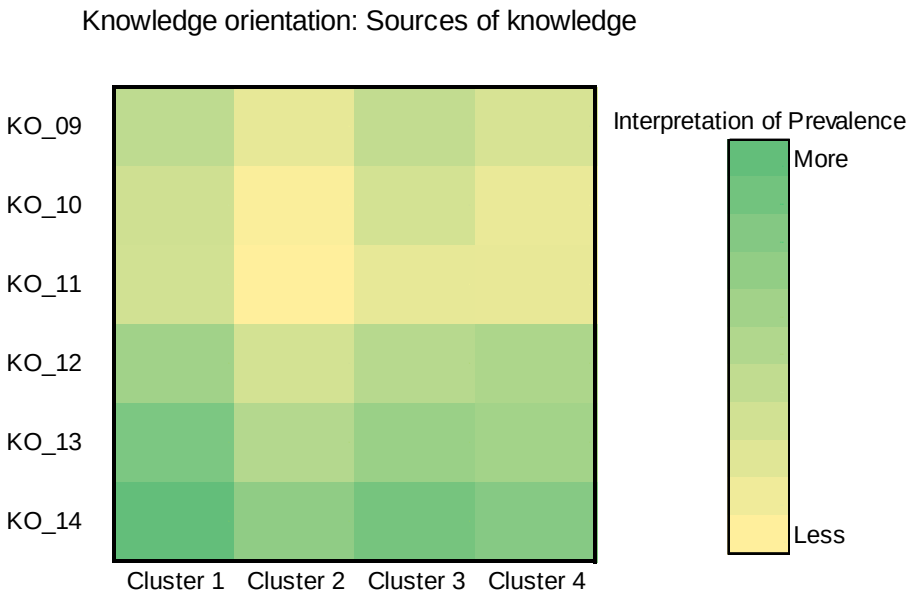


Figure 6.7: Heat map of knowledge sources

Variables KR_01 to KR_06 were not included in the cluster analysis, but have been used to provide additional insight into the knowledge orientation of the different clusters. Figure 6.8 presents the map of the role of knowledge within organisations.

Members of Cluster 1 view the use of standard or proven processes as the most significant contributor to their organisations' ability to compete, followed by improving products and services and improving processes.

Members of Cluster 2 also viewed the use of standard or proven processes as the most significant contributor, although its contribution was only rated as average.

Members of Cluster 3 viewed the use of standard or proven processes and improving products and services as the most significant contributors to their organisations' ability to compete.

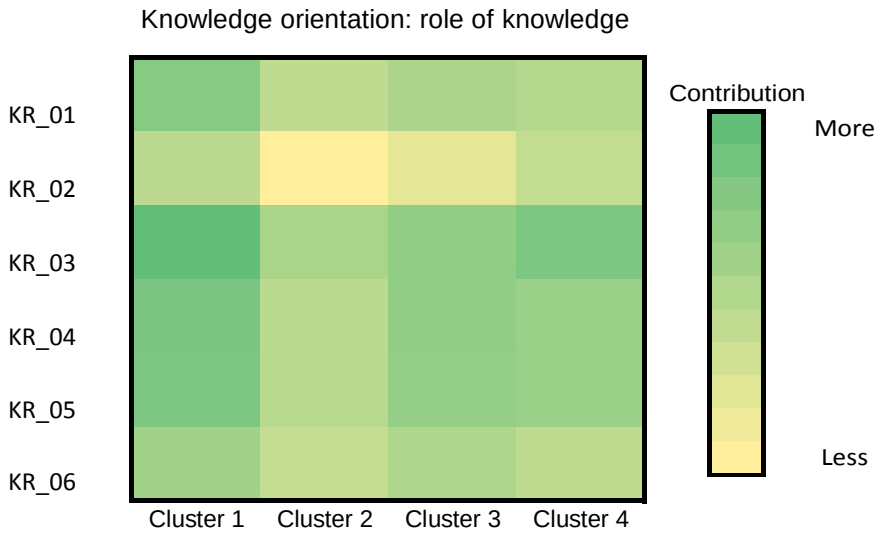


Figure 6.8: Heat map of knowledge role

Members of Cluster 4 viewed the use of standard or proven processes as the most significant contributor to their organisations' ability to compete, followed by improving products and services and improving processes.

6.4 Enactment

The enactment dimension focused on what an organisation is doing to create, extend and modify its knowledge base and included coordination, knowledge use, knowledge creation and knowledge integration as sub-dimensions. The four clusters' mean scores for each variable included in the enactment dimension are presented in Table 6.3.

All the Enactment clustering variables were significantly different at the 0.05 significance level. The cluster profiles of the enactment dimension presented in Figure 6.9 shows a clear distinction between the four clusters. The profile analysis shows that in Cluster 1 the enactment activities are performed in the most formal manner of all the clusters, with Clusters 3 and 4 more unstructured and Cluster 2 the least structured of all.

An exception is variable KE_15 ($F = 5.462$) which measured the creation of knowledge of suppliers. Cluster 1 ($\bar{X} = 0.77$) and Cluster 3 ($\bar{X} = 0.75$) seemed to have a more formal process in place while Cluster 2 ($\bar{X} = 0.66$) and Cluster 4 ($\bar{X} = 0.67$) clearly rated it as an unstructured activity. Variable KE_13 ($F = 5.699$) measured the creation of knowledge about customers and in this instance the four clusters all rated it as a more formal process. Variable KE_12 ($F = 7.536$) measured the conversion of knowledge about competitors into plans of action, and apart from Cluster 1, it was rated as an unstructured activity.

A notable difference occurred at KE_10 ($F = 45.284$) measuring the use of knowledge to improve efficiency. In Cluster 1 ($\bar{X} = 0.89$) it is a formal process, while in Cluster 3 ($\bar{X} = 0.71$) and Cluster 4 ($\bar{X} = 0.73$) it is a more unstructured activity.

Table 6.3: Analysis of the differences among four clusters on enactment

Variable	*F*	*p*	Cluster 1 *n = 83*	Cluster 2 *n = 52*	Cluster 3 *n = 60*	Cluster 4 *n = 79*
KE_01	17.218	0.000	0.79	0.62	0.68	0.65
KE_02	33.974	0.000	0.91	0.63	0.73	0.78
KE_03	34.589	0.000	0.83	0.50	0.68	0.70
KE_04	24.524	0.000	0.78	0.56	0.67	0.61
KE_05	33.243	0.000	0.89	0.58	0.73	0.72
KE_06	10.241	0.000	0.77	0.63	0.69	0.71
KE_07	15.694	0.000	0.82	0.65	0.70	0.74
KE_08	12.786	0.000	0.86	0.70	0.75	0.73
KE_09	16.252	0.000	0.84	0.67	0.73	0.75
KE_10	45.284	0.000	0.89	0.62	0.71	0.73
KE_11	24.557	0.000	0.88	0.63	0.74	0.74
KE_12	7.536	0.000	0.73	0.56	0.66	0.64
KE_13	5.699	0.001	0.84	0.71	0.80	0.78
KE_14	11.575	0.000	0.76	0.62	0.71	0.69
KE_15	5.462	0.001	0.77	0.66	0.75	0.67
KE_16	15.008	0.000	0.85	0.63	0.74	0.76
KE_17	12.885	0.000	0.78	0.58	0.72	0.67
KE_18	8.374	0.000	0.83	0.70	0.75	0.74
KE_19	8.229	0.000	0.80	0.65	0.76	0.69
KE_20	16.466	0.000	0.90	0.65	0.78	0.76
KE_21	36.115	0.000	0.90	0.61	0.74	0.77
KE_22	25.396	0.000	0.82	0.63	0.70	0.70
KE_23	35.177	0.000	0.88	0.56	0.77	0.78
KE_24	29.128	0.000	0.87	0.60	0.72	0.73
KE_25	22.672	0.000	0.79	0.59	0.67	0.67
KE_26	13.537	0.000	0.76	0.57	0.67	0.65
KE_27	18.340	0.000	0.75	0.56	0.68	0.64
KE_28	29.489	0.000	0.82	0.52	0.72	0.66
KE_29	31.337	0.000	0.88	0.58	0.72	0.75
KE_30	16.012	0.000	0.81	0.59	0.70	0.72
KE_31	24.556	0.000	0.82	0.54	0.70	0.70

Note: Standardised values are displayed.
The following scale was used: 1 = not performed; 2 = unstructured activitiy; 3 = formal process

In Cluster 2 ($\bar{X} = 0.62$) it was rated between an activity that does not occur and an unstructured activity. A similar difference occurred at KE_21 ($F = 36.115$) which measured the identification of best practices. In Cluster 1 ($\bar{X} = 0.90$) it again rated as a more formal process, while in Cluster 3 ($\bar{X} = 0.74$) and Cluster 4 ($\bar{X} = 0.77$) it was rated as a more unstructured activity. Cluster 2 ($\bar{X} = 0.61$) again rated it between an activity that does not occur and an unstructured activity.

In a number of instances notable differences between Cluster 3 and Cluster 4 emerged. The first is KE_01 which measured whether sources of knowledge are matched to problems and challenges. The second is KE_04 which measured whether knowledge is filtered. The third is KE_26 which measured whether knowledge of business partners was integrated into the organisation and then KE_27 which indicated whether different sources and types of knowledge were integrated. The last notable example is KE_28 which indicated whether outdated knowledge was being replaced. In all of these instances Cluster 3 rated the activities between formal and unstructured, where Cluster 4 rated them between not performed and unstructured.

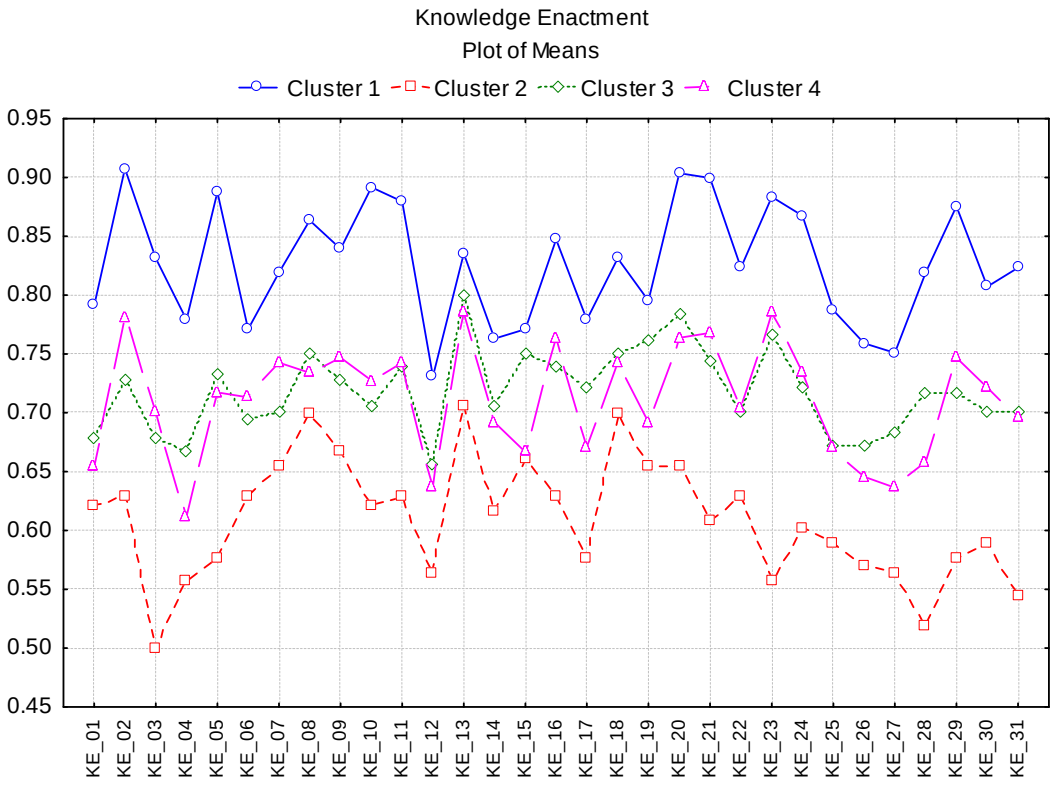


Figure 6.9: Profile analysis of enactment dimension

Heat maps of the enactment dimension provide more insight into the differences between the four clusters. Variables KE_01 to KE_05 represent coordination activities and the heat map displayed in Figure 6.10 clearly illustrates the more formal processes present in Cluster 1 and the weak coordination activities in Cluster 2.

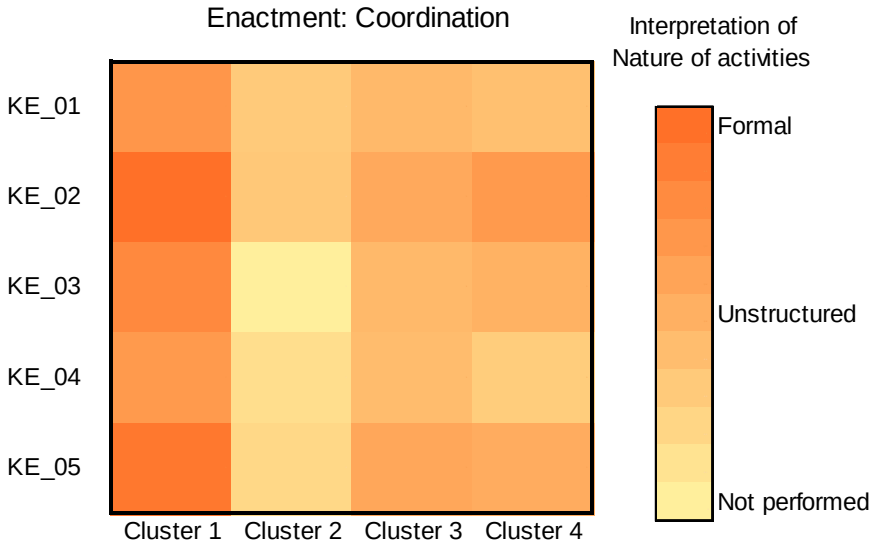


Figure 6.10: Heat map of coordination activities

Cluster 1's coordination activities rated as the most formal of all its enactment activities, while Cluster 3 and Cluster 4's coordination activities rated as the most unstructured of all its enactment activities.

Variables KE_06 to KE_12 represent knowledge use activities and the colour map, as presented in Figure 6.11 again illustrates the more formal nature of Cluster 1's activities and the weaker knowledge use activities of Cluster 2.

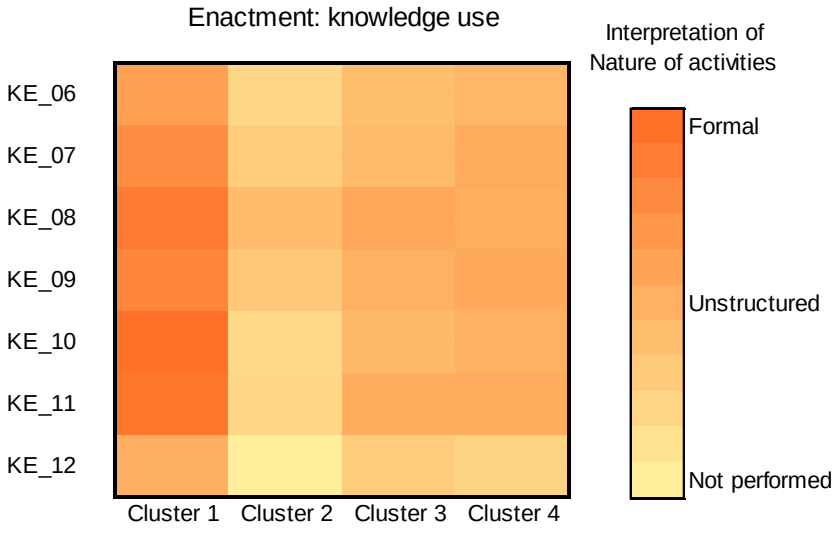


Figure 6.11: Heat map of knowledge use activities

The overall lower rating of KE_12 is also visible on the map. The knowledge use activities rated as the second most formal enactment activities of all the clusters. Cluster 1 also seems to have formal processes in place for using knowledge to improve efficiency (KE_10) and to adjust strategic direction (KE_11).

Variables KE_13 to KE_21 represent knowledge creation activities and the colour map in Figure 6.12 illustrate that Cluster 1's activities lean towards being more unstructured than in the previous colour maps. It seems though that benchmarking performance (KE_20) and identifying best practice (KE_21) are formal processes in Cluster 1.

The knowledge creation activities rated as the highest of all enactment activities in Cluster 2 and Cluster 3.

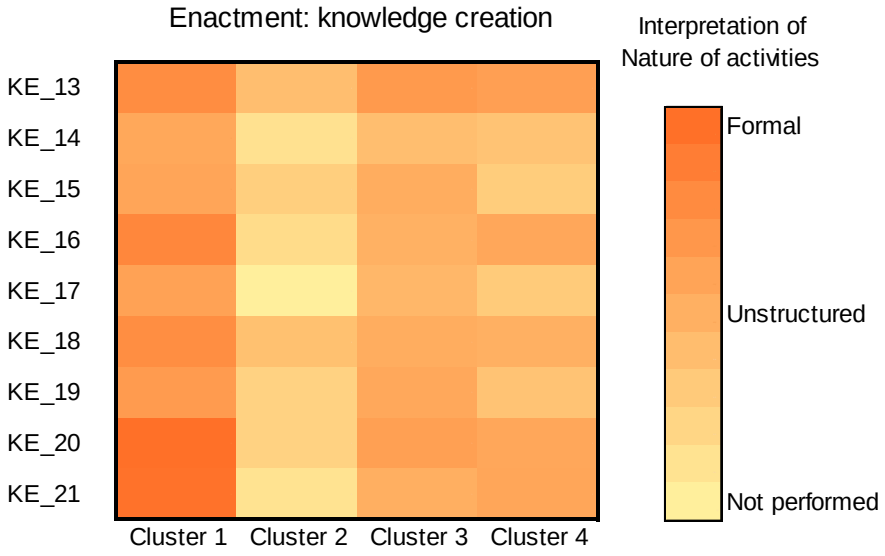


Figure 6.12: Heat map of knowledge creation activities

Variables KE_22 to KE_31 represent knowledge integration activities and the colour map in Figure 6.13 illustrates the more formal nature of these activities in Cluster 1. The distribution of knowledge throughout the organisation (KE_23), the transfer of organisational knowledge to individuals (KE_24) and capture and sharing of frequently used concepts (KE_29) were particularly rated as more formal processes in Cluster 1.

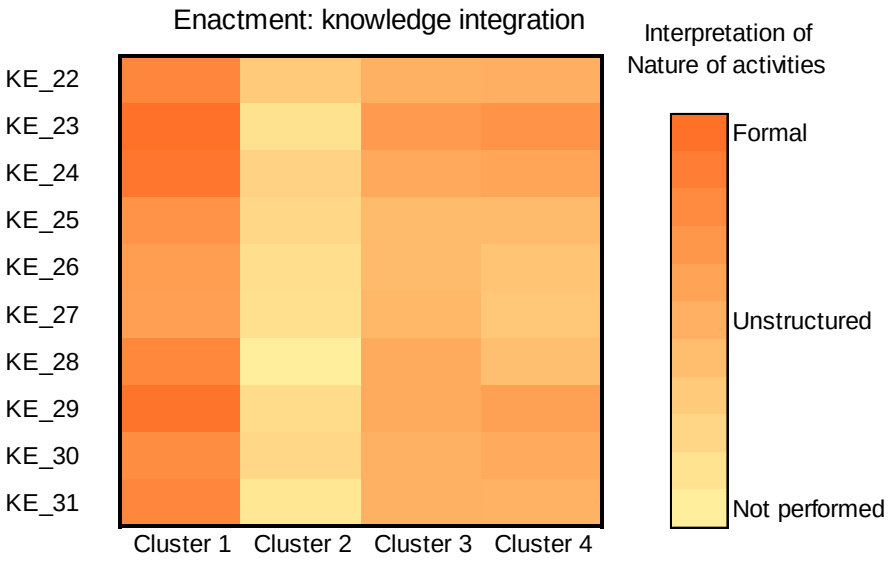


Figure 6.13: Heat map of knowledge integration activities

In Cluster 2 replacing of outdated knowledge (KE_28) was rated between not performed and unstructured. Knowledge integration activities were rated as the least structured of all enactment activities in Cluster 1, as well as in Cluster 2.

6.5 Labelling the clusters

6.5.1 Summary of differences

The most notable differences between the four clusters that emerged from the profile analysis and heat maps were used to label the four clusters as Holistic, Peripheral, Mechanistic and Roaming. The major differences between the four clusters are summarised in Table 6.4.

Table 6.4: Summary of most notable differences between the four clusters

	Holistic	Peripheral	Mechanistic	Roaming
	Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**
Intent				
Activities	●	○	◑	◔
Execution	Purposeful	Arbitrary	Tentative	Undirected
Strategy	- Formal	- None	*- Tentative*	*- Virtually none*
Approach	●	○	◑	◑
	Balanced	Arbitrary	Unbalanced	Unbalanced
				- No strategy
			- Technology focus	*- No structure*
				- No budget
			- No incentives	*- Strong incentives*
Culture	●	○	◑	◑
	Strong	Weak	Tentative	Tentative
Orientation				
Types	●	○	◑	◕
Relative importance	Balanced	One-dimensional	Scattered	Balanced
Contribution	Significant	Marginal	Average	Approaching significant
Most significant	Collective Explicit	Individual Tacit	Collective Explicit	Collective Explicit Individual Tacit
Flow	●	○	◑	◕
Level of interdependence	High	Low	Average	Approaching high
External sources	●	○	◕	◑
Usage	High	Low	More than average	Average
Most prevalent	Collective Explicit	Collective Explicit	Collective Explicit	Collective Explicit
Role	Exploit	Exploit	Exploit	Exploit
Exploit : Explore Balance	● ◑	◔ ○	◕ ◔	◕ ○
Enactment				
Between clusters				
Coordination	●	○	◑	◑
	More formal	Arbitrary	Unstructured	Unstructured
Knowledge use	●	○	◔	◑
	More formal	Arbitrary	Unstructured	Unstructured
Knowledge creation	●	○	◑	◑
	More formal	Arbitrary	Unstructured	Unstructured
Knowledge integration	●	○	◑	◑
	More formal	Arbitrary	Unstructured	Unstructured
Within cluster				
Coordination	●	◑	○	○
	Most formal		Most unstructured	Most unstructured
Knowledge use	◕	◕	◕	◕
Knowledge creation	◑	●	●	●
		Most formal	Most formal	Most formal
Knowledge integration	○	○	◑	◑
	Most unstructured	Most unstructured		
Effectiveness	●	○	◑	◑
	Significantly improved	Remained unchanged	Slightly improved	Slightly improved

Because multiple participants within an organisation completed the questionnaire, it was highly unlikely that an organisation would cluster only into one group. The distribution of the organisations across the four clusters is illustrated in Table 6.5.

Table 6.5: Distribution of group membership

		Holistic		Peripheral		Mechanistic		Roaming		Total
Company	Industry	%	n	%	n	%	n	%	n	
ChemWorx	Chemicals	25%	2	0%	0	38%	3	38%	3	**8**
PolyChem	Chemicals	8%	1	23%	3	46%	6	23%	3	**13**
W1 Engineers	Consulting engineering	48%	16	6%	2	27%	9	18%	6	**33**
F1 Engineers	Consulting engineering	45%	5	0%	0	9%	1	45%	5	**11**
T1 Engineers	Consulting engineering	24%	6	16%	4	24%	6	36%	9	**25**
Z Partners	Legal services	31%	4	15%	2	23%	3	31%	4	**13**
Cedar & Kirk	Legal services	43%	9	10%	2	33%	7	14%	3	**21**
Y Partners	Legal services	33%	1	33%	1	33%	1	0%	0	**3**
PharmaLab	Pharmaceutical	10%	2	50%	10	20%	4	20%	4	**20**
X-Pharma	Pharmaceutical	40%	2	0%	0	20%	1	40%	2	**5**
Mineco R&D	Resources	39%	15	13%	5	26%	10	21%	8	**38**
X-Mobile	Software services	20%	2	50%	5	10%	1	20%	2	**10**
FuturaSoft	Software services	41%	9	0%	0	5%	1	55%	12	**22**
PhantomSoft	Software services	0%	0	25%	1	25%	1	50%	2	**4**
Fourier Approach	Software services	25%	3	17%	2	0%	0	58%	7	**12**
SFT-Ware	Software services	50%	1	0%	0	50%	1	0%	0	**2**
Fundamo	Software services	0%	0	82%	9	9%	1	9%	1	**11**
M-Connectiv	Software services	0%	0	100%	2	0%	0	0%	0	**2**
Secura	Software services	0%	0	0%	0	0%	0	100%	1	**1**
XactSoft	Software services	25%	5	20%	4	20%	4	35%	7	**20**
Total			**83**		**52**		**60**		**79**	**274**

6.5.2 Holistic group

Cluster 1 was labelled ‘Holistic’ because of the apparent balance between its knowledge management capabilities. The Holistic group comprised 30% (n = 83) of all the observations. The group has a formal knowledge management strategy and shows a purposeful intent to create an environment where knowledge can be used as a strategic resource. The Holistic group’s approach to creating such an environment is balanced, with all activities being performed in a purposeful manner. The Holistic group also has a strong knowledge-culture.

The relative importance of different types of knowledge is balanced between individual tacit knowledge, individual explicit knowledge, collective tacit knowledge and collective explicit knowledge. The contribution of all these types of knowledge to the ability to compete is considered to be significant, with collective explicit knowledge deemed to be the most significant contributor. The flow of work is mostly collaborative and reciprocal. This high-level of interdependence between employees is an indicator of a need for formal coordination of knowledge activities. External knowledge sources are often used, with collective explicit knowledge again being the most prevalent. The role of knowledge seems to be balanced

between exploitation and exploration. A greater balance exists between exploitation and exploration than in the other groups.

Coordination activities are largely formal and also the most formal of all enactment activities in the Holistic group. Knowledge use, knowledge creation and knowledge integration activities are also more formalised, with the latter being the least structured of all the enactment activities.

The Holistic group's effectiveness has significantly improved over a 24-month period.

6.5.3 Peripheral group

Cluster 2 was labelled 'Peripheral' because any knowledge management activity that does happen seems to be by chance. Developing its knowledge management capabilities does not seem to be of central importance to this group. The Peripheral group comprised 19% (*n = 52*) of all the observations. The group does not have a formal knowledge management strategy and in its activities it does not show intent to develop an environment in which knowledge can be used as a strategic resource. The Peripheral group's knowledge-culture appears to be weak.

The relative importance of different types of knowledge is one-dimensional with only individual tacit knowledge is considered as marginally important to the ability to compete. Collaboration is not prevalent in the Peripheral group and independent, sequential and reciprocal work occurs often. This indicates a lower level of interdependence in the instances where work is independent or sequential, and a higher level of interdependence where work is reciprocal. More formal coordination of knowledge activities is required in instances of higher interdependence. The Peripheral group does not view knowledge as a strategic resource with knowledge exploitation only viewed as a marginal contributor to the ability to compete, and knowledge exploration not viewed as a contributor at all.

Enactment activities are largely arbitrary, with virtually none being clearly recognised as even an unstructured activity. Knowledge creation activities are the most formal of the group's enactment activities, although it still only falls between not being performed and being unstructured. Knowledge integration activities are the most unstructured of the group's enactment activities.

The Peripheral group's effectiveness has remained unchanged over a 24 month period.

6.5.4 Mechanistic group

Cluster 3 was labelled ‘Mechanistic’ mostly because the group has a strong focus on technology supporting knowledge management, while no incentives are in place to encourage the creation, sharing or use of knowledge. The Mechanistic group comprised 33% (*n = 60*) of all the observations. The group is unsettled in opinion about the existence of a formal knowledge management strategy, as well as the execution of most activities to create an environment where knowledge can be used as a strategic resource. As mentioned the group has a strong view of using technology to support knowledge management, but at the same time no incentives or mechanisms are deployed to encourage knowledge creation or sharing. The knowledge-culture in the group is also more tentative.

Knowledge is not really viewed as a strategic resource. The relative importance of different types of knowledge is scattered with collective explicit knowledge and individual tacit knowledge considered as only average contributors to the ability to compete. Work mostly flows in a reciprocal manner, indicating an average level of interdependence and the need for formal knowledge coordination activities. Knowledge exploitation is considered more important than knowledge exploration.

Enactment activities are largely unstructured, with knowledge creation activities being the most formal of all its enactment activities, and the coordination activities the most unstructured.

The Mechanistic group’s effectiveness has slightly improved over a period of 24 months.

6.5.5 Roaming group

Cluster 4 was labelled ‘Roaming’ because although knowledge is considered as a strategic resource, the group does not appear to have direction in the execution of its knowledge-related activities. The intent to create an environment to use knowledge as a strategic resource is unbalanced with no formal knowledge management strategy in place, no knowledge management function in place and no dedicated budget for knowledge management activities. The group does however have strong incentives in place to encourage the creation, sharing and use of knowledge. The knowledge culture in the group appears to be more tentative.

Knowledge is viewed as a strategic resource with a balanced view of the relative importance of different types of knowledge. Collective explicit knowledge, collective tacit knowledge

and individual tacit knowledge are considered more than average, almost significant contributors to the ability to compete. Work mostly flows in a reciprocal manner and collaboration occurs sometimes, indicating a high-level of interdependence and the need for formal knowledge coordination activities. Knowledge exploitation is considered more important than knowledge exploration.

Enactment activities are mostly unstructured, with knowledge creation activities being the most formal of all its enactment activities, and the coordination activities the most unstructured.

The effectiveness of the Roaming group has slightly improved over a period of 24 months.

6.6 Conclusion

Chapter 6 completed the cluster analysis process by providing labels for the four clusters identified in Chapter 5. The labels were decided on by interpreting the clusters in terms of the characteristics that differentiate them. A combination of profile analysis and heat maps was used to identify the main differences between the clusters and to present these distinctions in a visual format.

Cluster 1 was labelled the ‘Holistic’ because there seems to be a balance in its approach to knowledge management. Cluster 2 was labelled ‘Peripheral’ because any knowledge management activities that do occur seem to be by chance. Cluster 3 was labelled ‘Mechanistic’ because the cluster has a strong focus on using technology to support knowledge management, while no incentives are in place to encourage the creation, sharing or use of knowledge. Cluster 4 was labelled ‘Roaming’, because despite considering knowledge as a strategic resource, there doesn’t appear to be direction in the execution of the knowledge activities.

The labelling of the clusters thereby concludes the answer to the second research question, namely what configurations of knowledge-centric capabilities emerge in different organisational contexts, as illustrated in Figure 6.14.

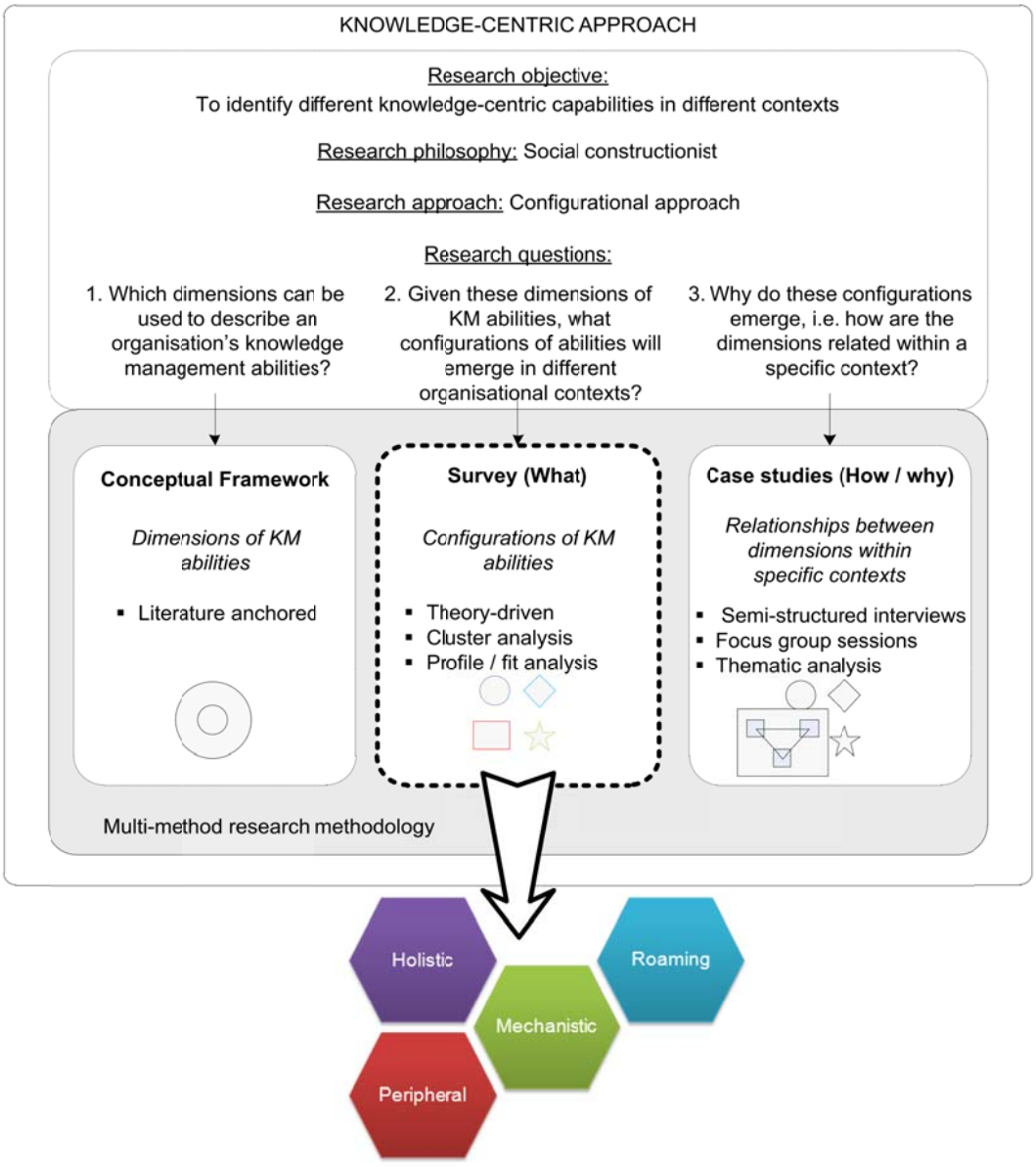


Figure 6.14: Conclusion of second research question

The study now turns to addressing the final research question, i.e. why do these configurations emerge in specific organisational contexts? The clusters are therefore discussed in more detail through case studies in Chapters 7, 8, 9 and 10, presenting the clusters as archetypes of knowledge-centric capabilities.

CHAPTER 7
CEDAR & KIRK: THE CASE OF A HOLISTIC CAPACITY

"Holism… here emerges in a sense victorious."

Jan C. Smuts

7.1 Introduction

The configuration of knowledge-centric capabilities of Cluster 1, interpreted in Chapter 6, was labelled a Holistic capacity because of an apparent balanced approach to knowledge management. In this chapter the Holistic capacity is discussed as an archetype of knowledge-centric organisations by using a case study to explain the emergence of a Holistic knowledge-centric capacity in a specific organisational context.

7.2 Case selection

Thirteen organisations met the criteria of a minimum of ten completed questionnaires, of which only three organisations met the combined criteria, previously defined in §4.6.2, of having at least 35% of its observations in the Holistic capacity with at least a 10% decrement to the closest group, as presented in Table 7.1.

Table 7.1: Organisations with primarily a holistic capacity

		Holistic		Peripheral		Mechanistic		Roaming		
Company	**Industry**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**Total**
Mineco R&D	Resources	39%	15	13%	5	26%	10	21%	8	**38**
W1 Engineers	Consulting engineering	48%	16	6%	2	27%	9	18%	6	**33**
T1 Engineers	Consulting engineering	24%	6	16%	4	24%	6	36%	9	**25**
FuturaSoft	Software services	41%	9	0%	0	5%	1	55%	12	**22**
Cedar & Kirk	Legal services	43%	9	10%	2	33%	7	14%	3	**21**
XactSoft	Software services	25%	5	20%	4	20%	4	35%	7	**20**
PharmaLab	Pharmaceutical	10%	2	50%	10	20%	4	20%	4	**20**
Z Partners	Legal services	31%	4	15%	2	23%	3	31%	4	**13**
PolyChem	Chemicals	8%	1	23%	3	46%	6	23%	3	**13**
Fourier Approach	Software services	25%	3	17%	2	0%	0	58%	7	**12**
F1 Engineers	Consulting engineering	45%	5	0%	0	9%	1	45%	5	**11**
Fundamo	Software services	0%	0	82%	9	9%	1	9%	1	**11**
X-Mobile	Software services	20%	2	50%	5	10%	1	20%	2	**10**
ChemWorx	Chemicals	25%	2	0%	0	38%	3	38%	3	**8**
X-Pharma	Pharmaceutical	40%	2	0%	0	20%	1	40%	2	**5**
PhantomSoft	Software services	0%	0	25%	1	25%	1	50%	2	**4**
Y Partners	Legal services	33%	1	33%	1	33%	1	0%	0	**3**
SFT-Ware	Software services	50%	1	0%	0	50%	1	0%	0	**2**
M-Connectiv	Software services	0%	0	100%	2	0%	0	0%	0	**2**
Secura	Software services	0%	0	0%	0	0%	0	100%	1	**1**
Total			**83**		**52**		**60**		**79**	**274**

The organisation with the largest percentage representation in the Holistic capacity should ideally have been chosen to participate in the case study. Two organisations, namely Mineco R&D and W1 Engineers, were however not available to participate in the case study, and Cedar & Kirk, meeting all the criteria and with the second highest percentage representation in the Holistic capacity, was therefore selected as the case study participant.

7.3 Case background

Cedar & Kirk[1] is one of the largest corporate law firms in South Africa with 62 directors, about 160 lawyers and more than 300 staff in total. The firm has regional practices in Sandton and Cape Town and provide legal services to clients working across Africa and globally. Cedar & Kirk is also a member firm of a well-known international alliance of legal practices.

Cedar & Kirk's main focus is on corporate and commercial law which includes practice areas such as finance, projects and banking, black economic empowerment, commercial litigation and arbitration, competition and antitrust, dispute resolution, employment, energy, environmental, media and technology, mergers and acquisitions, pensions, private equity, property, public sector, tax, telecommunications, and trademarks and intellectual property.

Cedar & Kirk operates in a number of industries, including aviation, banking, financial services, healthcare, technology, telecommunications, media, manufacturing, mining, oil and liquor.

Their vision is to be South Africa's premier law firm, and to be recognised for the quality of their client service, which is based on fostering relationships that provide the legal and business solutions needed by their clients for success. The firm has been awarded an 'AAA' rating by EmpowerDEX, an independent economic empowerment agency, which is the second highest black economic empowerment rating available.

Cedar & Kirk considers legislative changes and case law as its primary drivers of change. It is therefore important that the firm keeps up to date with those changes. Law firms all offer more or less the same services, so Cedar & Kirk considers quality client service as a differentiating factor and a critical contributor to their success. This includes attracting the right calibre of client and also ensuring quick turnaround time of services rendered.

[1] *Cedar & Kirk* is a pseudonym. The firm requested to remain anonymous.

Knowledge management was initiated in 2002 as part of Cedar & Kirk's business strategy to address the skills gap of previously disadvantaged candidate attorneys. The firm learned about the value of knowledge management through its association with a global legal services organisation. The associate has a very advanced knowledge management programme with more than 40 employees dedicated to the function. Initially Cedar & Kirk's knowledge management initiative was driven by a senior director who was near his retirement.

One of the first initiatives put in place was a training programme called Legal English, through which the firm trains new candidates how to draft legal documents in legal English. The partner also drafted a number of standard documents which could be reused in the firm. In 2004 the firm decided to appoint a dedicated person in the position of director of knowledge management. Now the firm has a number of knowledge management initiatives running, including monthly case studies, legal update presentations and a knowledge repository.

7.4 Data analysis

The data for the case study were collected through a semi-structured interview with the director of knowledge management, as well as focus group sessions with employees who also participated in the knowledge management survey.

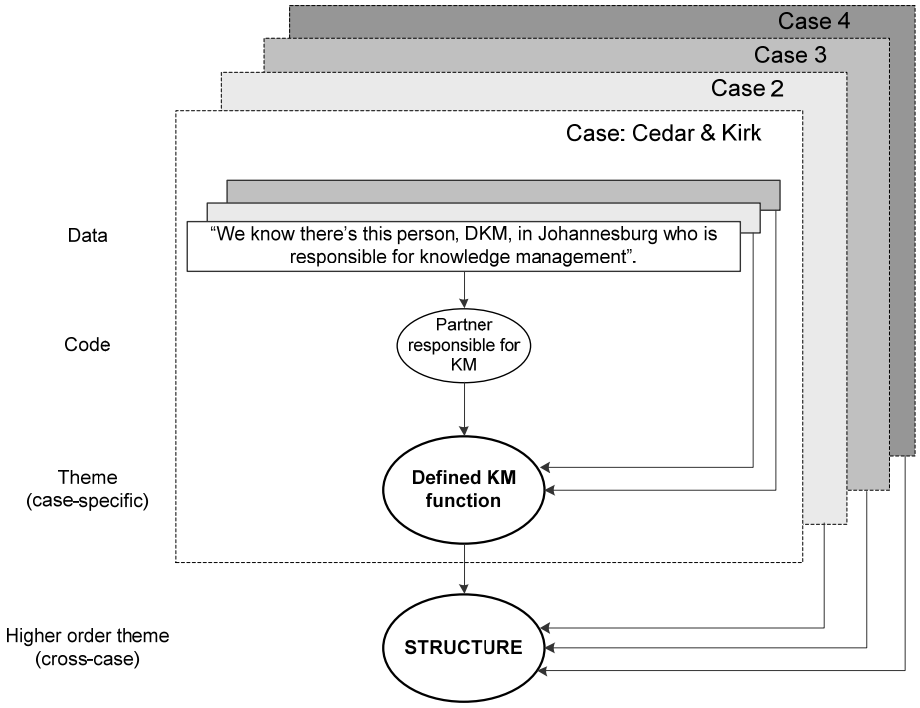


Figure 7.1: Example of the thematic data analysis

The interview and focus group sessions were conducted at Cedar & Kirk's head office in Sandton and regional office in Cape Town. Secondary data was obtained from company information available in the public domain, including the corporate website and press releases. Video recordings of the interview and focus group sessions were transcribed using InqScribe and the transcripts were coded in NVivo 8. From each of the codes, case-specific themes were identified. Comparative higher order themes were identified across all four cases, while the case-specific themes vary from one case to the next, as illustrated above in Figure 7.1.

The mapping of the various themes to the knowledge-centric capability framework is presented in Figure 7.2. The inner and outer tiers respectively represent the three dimensions of the knowledge-centric capability framework and the five sub systems of a viable system, as first presented in Figure 3.5.

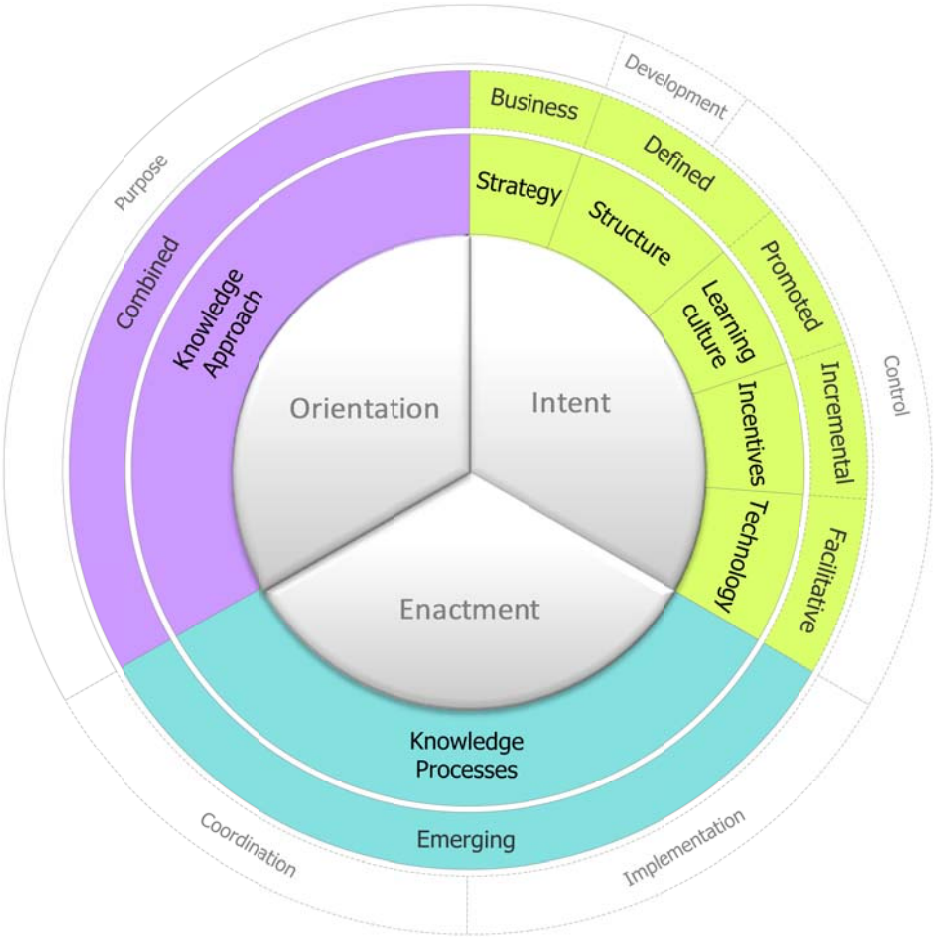


Figure 7.2: Thematic analysis of the Holistic capacity of Cedar & Kirk

The comparative main themes are presented in the second tier, while the case-specific themes are presented in the third tier. In analysing the data the emphasis was placed on identifying the factors that influence the knowledge-centric capability of the organisation.

From the thematic analysis, five case-specific themes emerged in the Intent dimension of the knowledge-centric capabilities framework, namely Business strategy, Defined structure, Promoted learning culture, Incremental incentives and Facilitative technology. One theme, namely Combined knowledge approach, emerged in the Orientation dimension and one theme, Emerging knowledge processes, emerged in the Enactment dimension. In isolation the themes cannot tell us much about the emergence of the Holistic capacity. The chapter therefore next explores the various themes in more detail, and discuss the interrelationships that emerged between them.

7.5 Discussion

7.5.1 Interrelationships

The discussion that follows explains why the Holistic capacity emerged as a configuration of knowledge-centric capabilities in a specific organisational context, by exploring each of the themes and their interrelationships.

Themes are discussed on the hand of a graphical representation of the theme, as outlined in Figure 7.3.

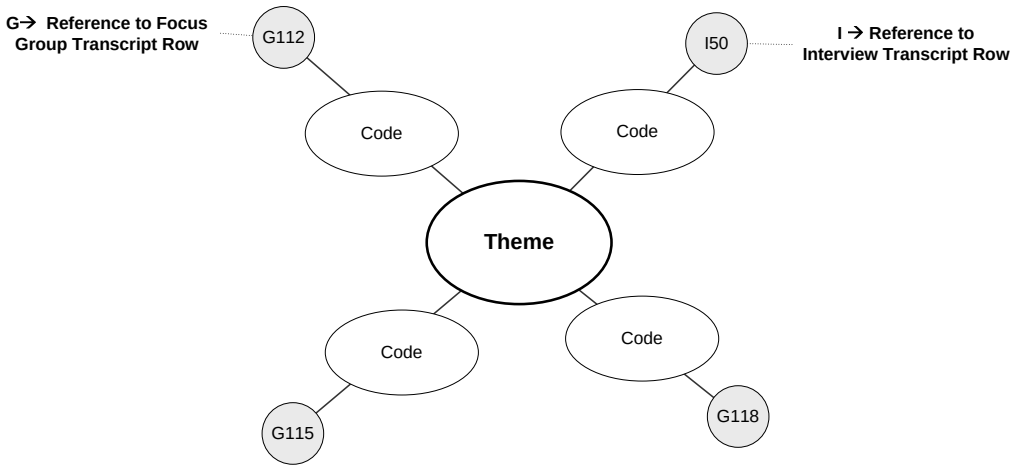


Figure 7.3: Anatomy of the theme representations

The theme is presented in the centre of the diagram, while the codes are presented in the middle-tier. The references to the data are presented in the outer-tier, with a ‘G’ referring to

the focus group transcript and an ‘I referring to the interview transcript. The number following the ‘G’ or ‘I’ refers to the row in the corresponding transcript. The list of codes is presented in Appendix H and the list of themes is presented in Appendix L. The transcripts are presented in Appendix D.

In order to provide a clear presentation of the interrelationships, the thematic analysis presented in Figure 7.2 is unpacked in an organising framework. This allows sense to be made of the data and case study themes within the dimensions of the knowledge-centric capability framework originally presented in §3.6, which also served as the theoretical base for the case study questions.

The interrelationships between the various themes that emerged in Cedar & Kirk are illustrated in Figure 7.4. The mapping to the knowledge-centric capability framework is visible in the green blocks, representing the Intent dimension, the purple blocks, representing the Orientation dimension and the turquoise blocks, representing the Enactment dimension. The mapping to the ‘organisation-as-a-viable-system’ view is visible in the five sub-systems of the Viable Systems Model, namely System 5 - Purpose, System 4 - Development, System 3 - Operational control, System 2 - Coordination and System 1 - Implementation.

The codes from which the respective themes emerged are numbered within each theme block, while the interrelationships are represented by the black and white connectors, numbered one through seven.

Each of the themes and the underlying interrelationships are discussed next.

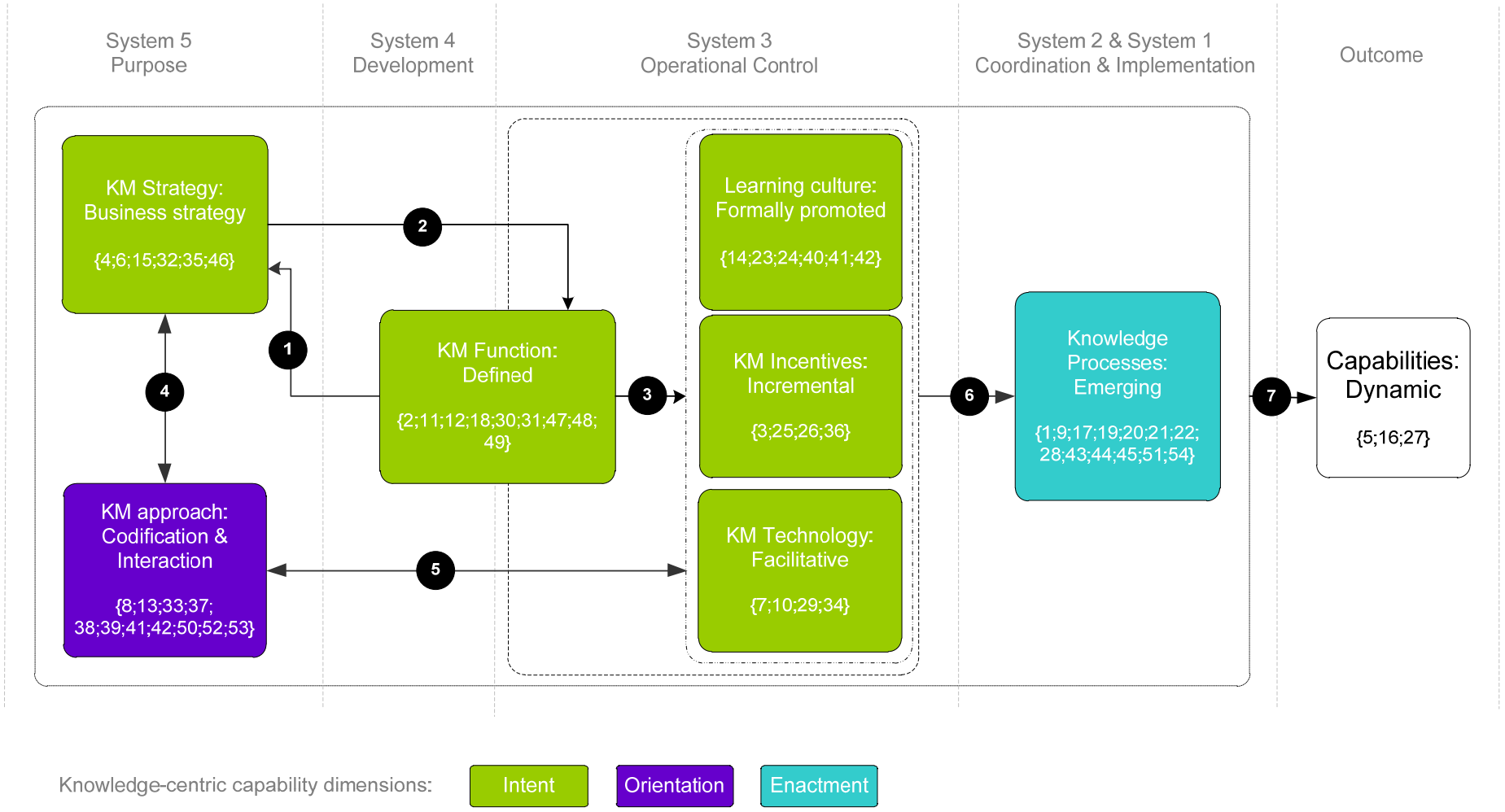


Figure 7.4: Interrelationships between Cedar & Kirk's themes

7.5.2 Knowledge management as part of business strategy

The discussion in §3.6.2 highlighted that a formal, clearly articulated knowledge management strategy is a key success factor to knowledge management initiatives (Davenport*, et al.*, 1998; Khalifa & Liu, 2003; Skyrme & Amidon, 1997; Wong & Aspinwall, 2005). Knowledge management forms an integral part of Cedar & Kirk's business strategy. The "knowledge management part of business strategy" theme emerged from eleven statements, as illustrated in Figure 7.5.

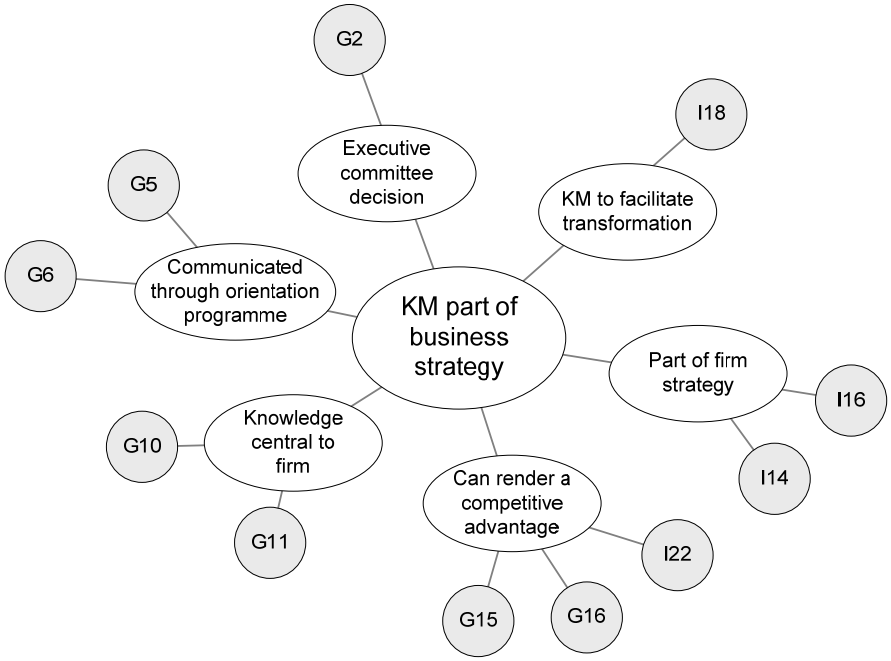


Figure 7.5: Emergence of the KM part of business strategy theme

Although Cedar & Kirk doesn't have a documented knowledge management strategy, knowledge management is viewed as an integral part of the firm's business strategy. Initially the firm launched a knowledge management initiative to address the skills gap between previously disadvantaged candidate attorneys and candidate attorneys with high levels of training:

> *"…you know, a lot of the transformation candidates haven't necessarily been at university and haven't had the level of training that some of the university candidates have had. We found there was a big gap between, you know, if I can be … call it as it is, the white students coming in and the black students who haven't had the benefit or sort of the level of education in the past. So I suppose our main aim with bringing in knowledge management in initially was to try and address that gap". (Appendix D:I18).*

The focus of the firm's knowledge management initiative has since evolved to focus on enhancing employee skills, achieving better response times and improving client relationships. The director of knowledge management explains:

> *"Obviously, the sooner you can generate the document that your client wants and give it to them, the happier your client is going to be. So our view is if we can have a database of documents that have been created, that are up to date and current, that users can access, they'll be able to turn that document around for the client a lot faster than having to almost redraft the document when they were working with something outdated. And I suppose quicker response times means increased productivity". (Appendix D:I22).*

From a viable system perspective, as discussed in §3.6.5, a knowledge management strategy forms part of System 5 - Purpose, which is responsible for the direction of knowledge management within the organisation (Beer, 1994; Jackson, 2003). From the above statements it can be thus be asserted that even though Cedar & Kirk's knowledge management strategy is not formally documented, the direction of the strategy is clearly articulated. This is confirmed by the awareness of knowledge management amongst the professionals who participated in the focus group:

> *"It was brought to our attention fairly early in our careers". (Appendix D:G5).*

> *"It's part of your orientation programme at the beginning of the year when you've just arrived." (Appendix D:G6).*

> *"If you can get two agreements out the same time your competitor gets one out, you make twice the amount of money and you also impress the client". (Appendix D:G16).*

7.5.3 A formally promoted learning culture

The second comparative theme that was identified is the learning culture of the organisation. Cedar & Kirk's learning culture emerged as "formally promoted" from eight statements, as illustrated in Figure 7.6.

Legal English is a formal training programme provided to candidate attorneys to teach them how to draft in legal English. Other formal learning activities include monthly case studies where certain court decisions in different practice areas, for example commercial or litigation, are considered and junior attorneys are expected to prepare questions.

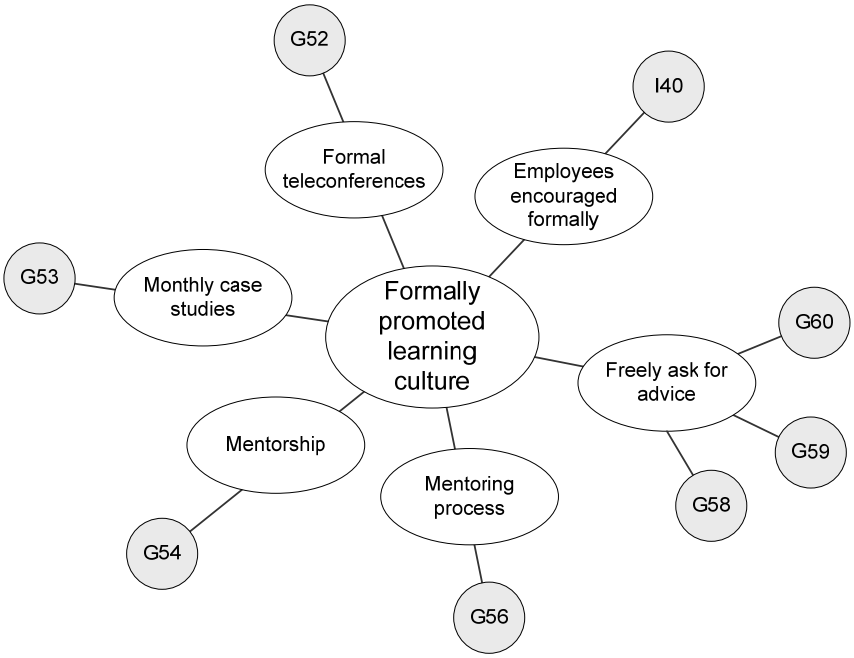


Figure 7.6: Emergence of the formally promoted learning culture theme

Another formal learning activity is legal update presentations where professionals are invited to give a presentation about for example a new law that has come into effect. The formal learning activities stimulate discussion and sharing of experiences. The firm also has a system of senior and junior practitioners working together on projects. This is viewed as part of a mentoring process that takes place. Furthermore professional employees are encouraged to keep them updated in specific fields by attending seminars or undertaking further study. It would therefore seem that Cedar & Kirk has a number of learning activities in place that can stimulate thinking and enable the identification of new opportunities, as suggested by Teece *et al.* (1997). Previous research (Eisenhardt & Martin, 2000; Teece, *et al.*, 1997; Zollo & Winter, 2002) has also shown that organisational learning plays an important role in the emergence of dynamic capabilities. One could therefore expect to see dynamic capabilities emerge in Cedar & Kirk.

7.5.4 Incrementally implemented incentives

A third comparative theme that was identified is “Incentives”. Cedar & Kirk’s sub-theme of ‘incremental incentives’ emerged from five statements, as illustrated in Figure 7.7.

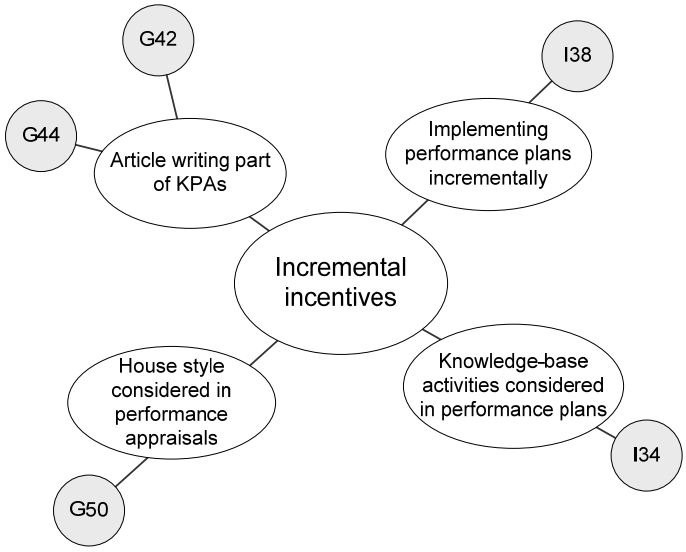


Figure 7.7: Incrementally implemented incentives sub-theme

In previous research rewards and incentives are considered important components of the knowledge management process (Argote, *et al.*, 2003; Davenport, *et al.*, 1998; Liebowitz, 1999b; Lucas & Ogilvie, 2006; Skyrme & Amidon, 1997). Cedar & Kirk are implementing incentives for knowledge management in an incremental manner as the director for knowledge management explains:

> *"At the moment the performance plans are only in place for directors. It is being filtered down to the other levels, but it isn't there yet. It will only be there by June. So in the past, and that's probably what their current view is, their reward for contributing to knowledge for instance is that they will, you know if they write articles for instance and they get published, they are recognised for that publication". (Appendix D:I38).*

Davenport *et al.* (1998) further argues that it is important that motivational approaches aimed at encouraging more effective behaviour should be long term, tying in with the general evaluation structure (Davenport, *et al.*, 1998). This is clearly the case in Cedar & Kirk where directors are also evaluated based on their contribution to the knowledge base:

> *"So now they've actually formalised that process and in terms of the current performance plans, there are specific key points indicated and of those there are ones of adding to the firm's knowledge base – assisting in the creation of knowledge". (Appendix D:I34).*

Another important success factor of knowledge management initiatives is senior management support (Davenport, *et al.*, 1998; Davenport & Prusak, 1998; Khalifa & Liu, 2003; Skyrme &

Amidon, 1997). Getting directors to actively participate in the knowledge management initiative therefore holds a significant advantage to Cedar & Kirk.

7.5.5 Facilitative knowledge management technology

The fourth comparative theme that was identified is knowledge management technology. In Cedar & Kirk a sub-theme of 'facilitative technology' emerged from five statements, as illustrated in Figure 7.8.

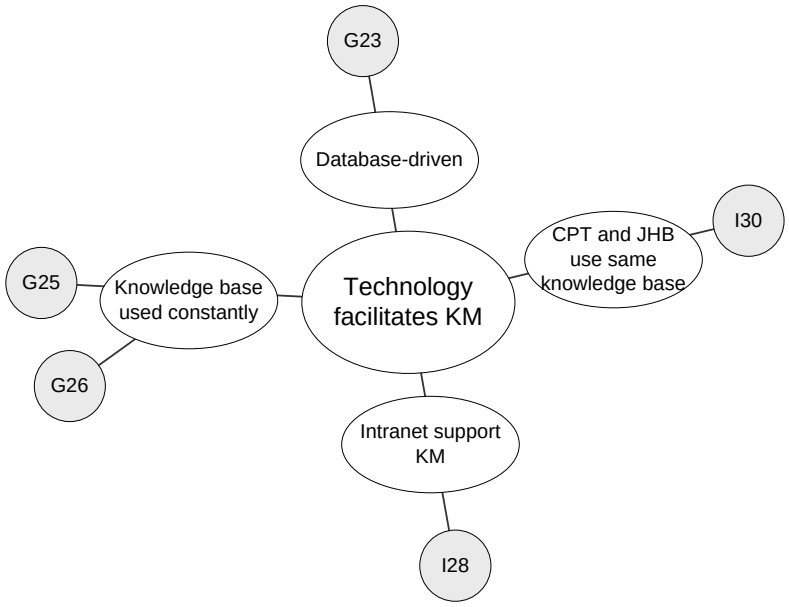


Figure 7.8: Facilitative knowledge management technology sub-theme

Although not affecting knowledge management success directly (Khalifa & Liu, 2003), a well-developed technical infrastructure can significantly enhance organisational knowledge management processes (Alavi & Leidner, 2001; Alavi & Tiwana, 2003; Davenport, *et al.*, 1998; Liebowitz, 1999b; Skyrme & Amidon, 1997; Zack, 1999b). Cedar & Kirk recently implemented a new intranet to facilitate knowledge management in the firm. Previously the Sandton and Cape Town offices had separate intranets and the Cape Town office did not have access to the knowledge management database. The two offices also used different versions of software, which meant that any documents shared between the two offices did not necessarily look the same. The new intranet addresses these issues and also consolidates access to all external databases, including Sabinet.

The director for knowledge management however feels that the firm's use of information systems doesn't yet fulfil its potential in terms of knowledge management:

"So, they do support it (knowledge management), but not necessarily as I say advance it yet. We are starting getting there. We are now looking at document assembly and other information systems as well". (Appendix D:I.28).

Conversely using the knowledge database forms an integral part of the firm's work, particularly in the case of the junior professionals. When asked whether the database is used on a daily basis, the focus group replied:

"On an hourly basis"! (Appendix D:G.25).

It would therefore seem that although Cedar & Kirk's use of technology to advance knowledge management still leaves plenty of room for improvement, the technology that is in use already plays an integral role in improving the productivity of junior professionals.

7.5.6 Defined knowledge management function

The fifth comparative theme that was identified is knowledge management structure. In Cedar & Kirk the knowledge management structure is formally defined, and the output, roles and responsibilities regarding knowledge management are clearly communicated.

The sub-theme of a 'Defined' knowledge management function emerged from eleven statements as illustrated in Figure 7.9.

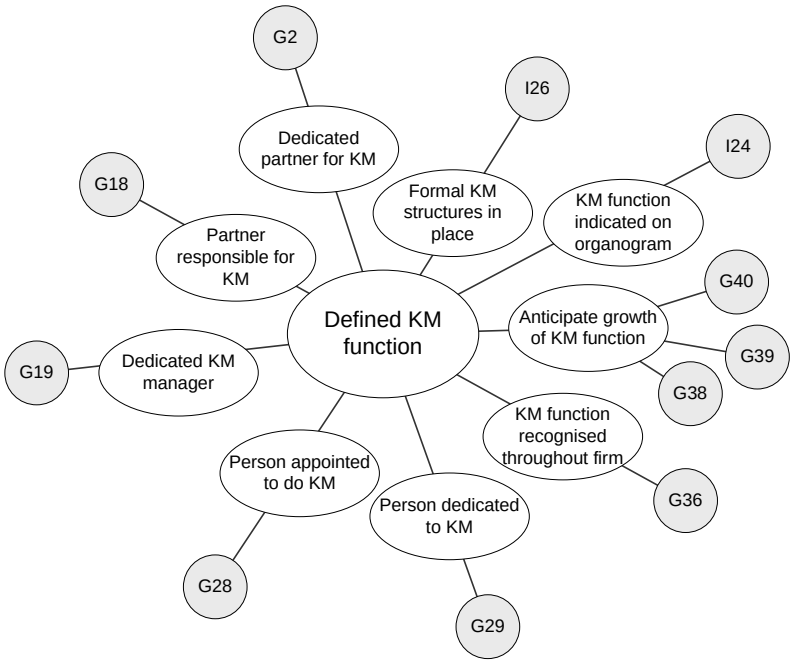


Figure 7.9: Defined knowledge management structure sub-theme

Cedar & Kirk's knowledge management structure is formally defined in the form of a person dedicated to the role of director of knowledge management. The person is widely recognised throughout the firm as the custodian of knowledge management. It is however important to ensure that the knowledge management initiative can survive without the support of the designated custodian (Davenport, *et al.*, 1998), meaning knowledge management processes need to become embedded in the way things are done in the firm. This seems to be the case in Cedar & Kirk, where the knowledge management database already forms an integral part of the daily work routine.

Cedar & Kirk's appointment of a director dedicated to knowledge management is in line with the view (Davenport, *et al.*, 1998; Davenport & Prusak, 1998; Holsapple & Joshi, 2000; Liebowitz, 1999b; Ribière & Sitar, 2003; Skyrme & Amidon, 1997) that knowledge management leadership, which includes a formal knowledge management function, is a key success factor for knowledge management initiatives.

The focus group also felt that knowledge management fulfils an important role in the firm and that the function will probably receive additional resources in the future:

> *"I certainly hope that it will increase over time. It is one of our critical things". (Appendix D:G39).*

> *"It's going to have to as well. We are planning to increase the size of the firm as well over a short period of time, so we'll need to probably enhance the ability to drive this". (Appendix D:G40).*

These views indicate that knowledge management is deemed successful in Cedar & Kirk, as growth in the resources attached to knowledge management is considered a key indicator of knowledge management success (Davenport, *et al.*, 1998).

The presence of a formal knowledge management function in Cedar & Kirk plays a central role in the knowledge-centric capability of the firm. This is particularly evident from the interrelationships between the knowledge management purpose, development and control within the firm. These interrelationships are presented as connector 1, connector 2 and connector 3 in Figure 7.10.

In §2.3 the organisation was explored as an open, goal-seeking system and the organisational ability to align itself to its environment was identified as a prerequisite for a viable

organisation. This is achieved through a process of organisational learning (Daft & Weick, 1984; Fiol & Lyles, 1985) which involves scanning the environment and providing data to managers, giving meaning to the data through interpretations, and learning which means taking action based on the interpretation.

The first interrelationship, represented by connector 1 in Figure 7.10, emerged between the knowledge management strategy as part of the business strategy and the formally defined knowledge management function, which can respectively be mapped to the Purpose and Development sub-systems of a viable system, as was shown in §3.6.5.

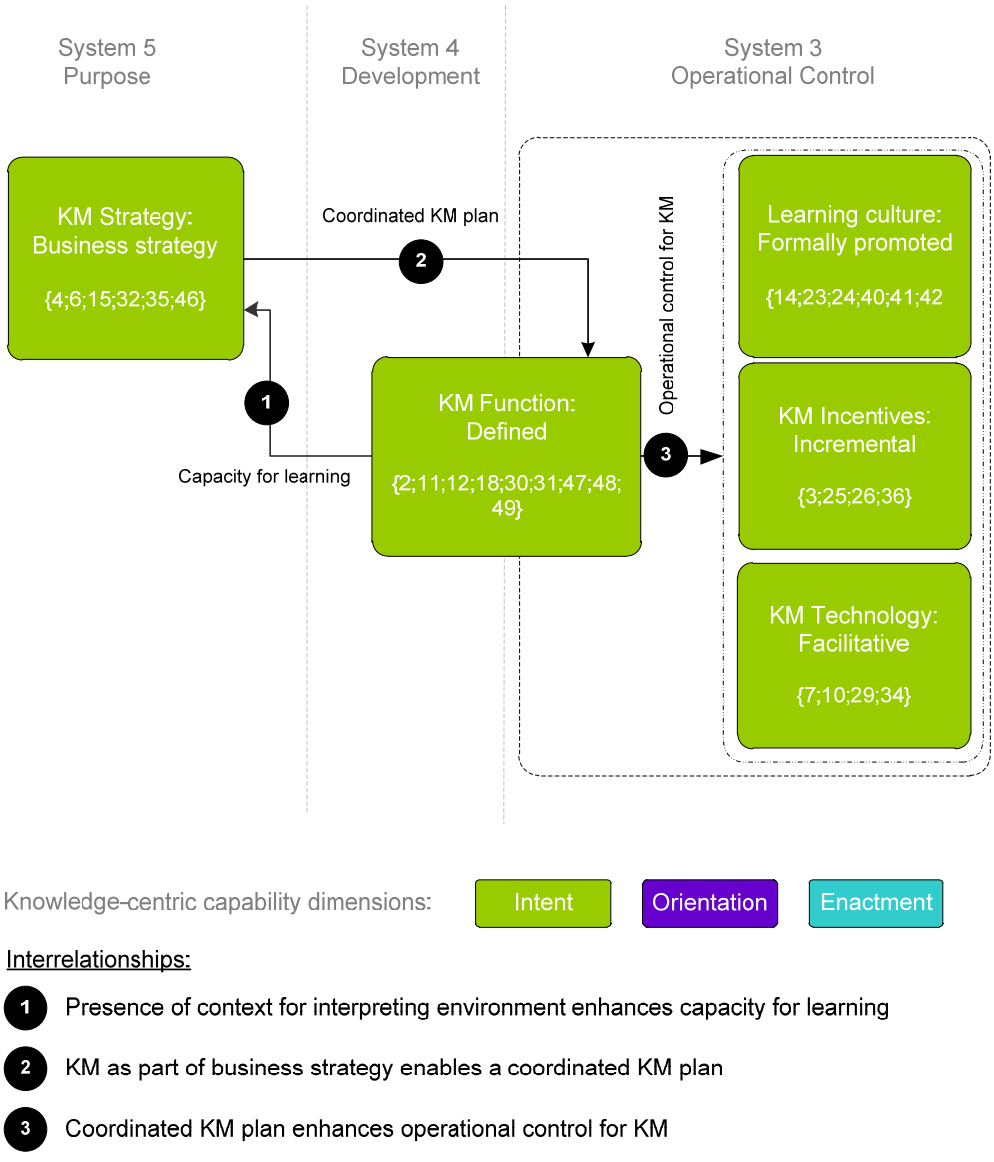


Figure 7.10: Emerging interrelationships between purpose, development and control

Connector 1 represents the impact of the formally defined knowledge management function, which corresponds to System 4 (Development) of the viable systems model. As discussed in §2.3.3, System 4 typically has to provide a structure for bringing together knowledge about the external and internal environment which should form the basis for decision making and strategy formulation (Beer, 1972; Jackson, 2003) . The nature of this function in Cedar & Kirk means that System 5 (Purpose), which is responsible for formulating the knowledge management strategy, receives information from System 4 and the knowledge management strategy can therefore be based on information about the firm's total environment. This presence of what Daft and Weick (1984) call the scanning stage in the learning process, means the Cedar & Kirk's knowledge management strategy can be adequately informed about changes in the environment, facilitating decision making and enabling the firm to align the knowledge management strategy with changes in the environment.

This is evident from Cedar & Kirk's realisation that knowledge management can be used to address issues of transformation by developing the skills of previously disadvantaged candidate attorneys and sharing expertise in order to address the skills gap. The extent to which the firm is in touch with its changing environment in this regard, is evident from the 80% awarded to Cedar & Kirk for skills development by EmpowerDEX, the economic empowerment rating agency. One can therefore argue that Cedar & Kirk is successful in creating a structure for bringing together knowledge about its external and internal environment, providing it with the capacity for double-loop learning.

The second interrelationship, represented by connector 2, presents the presence of a coordinated KM plan and emerged between the knowledge management strategy as part of business strategy, and the part of the knowledge management function responsible for operational control. As discussed in §2.3.3, in a viable system the control function (System 3) is not responsible for initiating the knowledge management strategy, but rather to interpret it and to pass a coordinated plan on to the business units for implementation (Beer, 1994; Jackson, 2003).

Even though Cedar & Kirk's knowledge management strategy is not formally documented, it has been interpreted and is being communicated as a formally coordinated knowledge management plan. The plan consists of a number of initiatives, including the Legal English training programme, the knowledge database containing standard legal documents, monthly case studies and legal update presentations.

The third interrelationship, namely operational control for knowledge management, is represented by connector 3. It emerged between the defined knowledge management function and three other components of operational control, namely learning culture, incentives and technology. The discussion in §2.3.3 showed that, in a viable system, the operational control system is responsible for interpreting the strategy and communicating it as a coordinated plan to business units for implementation (Beer, 1994; Jackson, 2000). The success of Cedar & Kirk's approach to knowledge management is evident in three components of operational control.

First, the manner in which a learning culture is formally promoted shows that coordinated processes are in place to establish a learning culture, which plays an important role in the emergence of dynamic capabilities (Eisenhardt & Martin, 2000; Teece, *et al.*, 1997; Zollo & Winter, 2002). The focus group's response highlights the presence of a learning culture within the firm:

> *"First it's about educating people that we are trying to work in teams here. We have a senior practitioner and more junior people working together on the bigger projects and I guess that's a way of parting knowledge too. It's kind of part of a mentoring process that takes place. It's the way we work". (Appendix D:G54 & 56).*

Second the operational plan for knowledge management is also evident in the incremental implementation of incentives for knowledge management. Candidate attorneys are rewarded for writing and publishing articles and adherence to the house style when drafting documents is considered as part of their performance appraisals. On the other hand, directors' contribution to the firm's knowledge base is considered during performance appraisals using formal key indicators. These indicators should provide Cedar & Kirk with valuable insight into the performance of knowledge-related activities, strengthening the value of the auditing role of System 3, as discussed in §2.3.3.

Finally, Cedar & Kirk's use of technology to facilitate knowledge processes, as discussed in §7.5.5, further emphasises the presence of a knowledge management plan to coordinate the sharing and use of knowledge in the firm.

These events do not occur in a haphazard manner, but is the result of a careful interpretation of the firm's knowledge management strategy, and clear communication to the firm's

professionals who all seem to understand what is expected in terms of knowledge management, as well as who is responsible for knowledge management:

"We've now got DKM in Johannesburg who has actually given up all her clients, all her legal work, and it suited her for other reasons, but she just does knowledge management now". (Appendix D:G2).

"We also know there is this person, DKM, in Johannesburg who is responsible for it". (Appendix D:G18).

"She is constantly managing and driving it". (Appendix D:G19).

From a viable system perspective one can therefore deduce that the part of the knowledge management function responsible for communicating a coordinated knowledge management plan (System 3), is functioning in a viable manner.

7.5.7 Combined knowledge management approach

The fifth comparative theme that was identified is 'knowledge management approach'. In Cedar & Kirk the 'Codification and interaction' or "combined knowledge management approach" sub-theme emerged from fifteen statements, as illustrated in Figure 7.11.

Cedar & Kirk has developed a knowledge base where standard document templates, legal opinions and precedents are stored. The knowledge base is used quite extensively throughout the firm and is brought to the attention of candidate attorneys fairly early in their careers:

"It's part of our orientation programme at the beginning of the year when you've just arrived. You'll spend two weeks learning all about the database, how to access it and how to change things". (Appendix D:G6).

Previous research (Hunter, Beaumont, & Lee, 2002) has shown that law firms generally focus their knowledge management efforts on creating knowledge repositories, i.e. the codification of knowledge, while processes for sharing knowledge through socialisation and interaction remain underdeveloped.

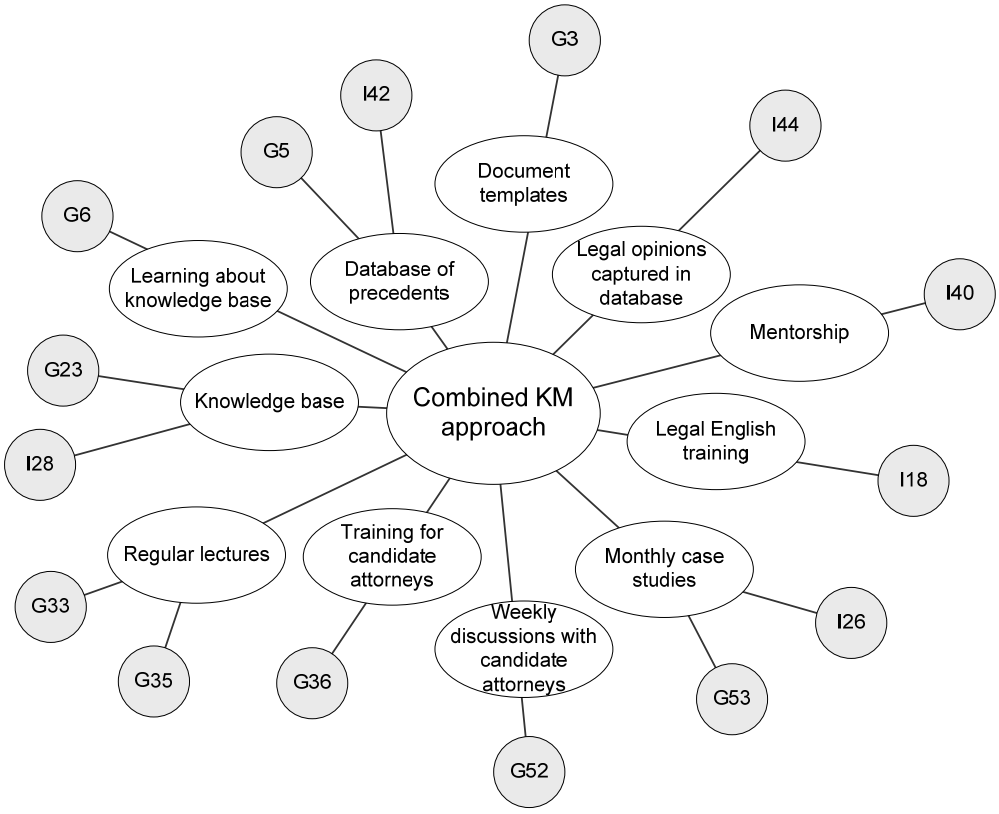


Figure 7.11: Codification and interaction approach sub-theme

This is however not the case in Cedar & Kirk. While a considerable amount of effort is spent on creating and maintaining the knowledge repository, the firm's knowledge management initiative also focuses on creating an environment where knowledge can be shared through socialisation and interaction:

> *"We also felt that it was really important for there to be forums where the sort of more experienced professionals are able to share their experiences or pass comments in the presence of junior professionals and they can ask questions and there can be a formal debate and share knowledge in that way". (Appendix D:I26).*

Examples of these processes focusing on knowledge sharing include monthly case studies where recent cases are discussed between experienced and junior professionals, legal update presentations, a Legal English training programme and mentorship of junior professionals by directors.

Although multiple channels for knowledge transfer are considered a key factor for knowledge management success (Davenport, *et al.*, 1998), Cedar & Kirk's combined approach to knowledge management is far less common in law firms (Hunter, *et al.*, 2002) and gives rise

to the emergence of the two interrelationships, presented as connector 4 and connector 5 in Figure 7.12.

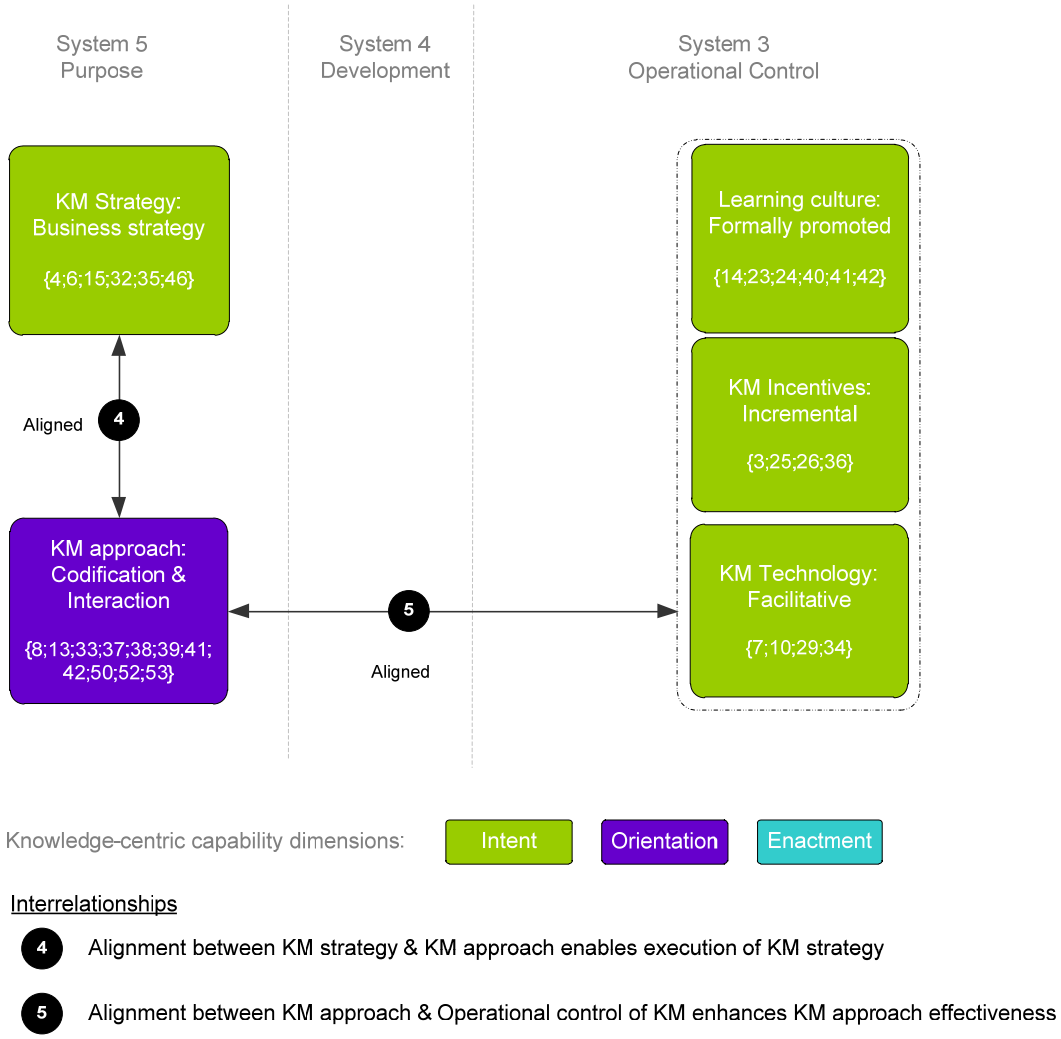


Figure 7.12: Interrelationships between strategy, approach and operations

Connector 4 represents the alignment between Cedar & Kirk's knowledge management strategy and approach. As discussed in §7.5.2, Cedar & Kirk's knowledge management strategy evolved from addressing the skills gap to improving response times and providing good client service. The combined approach to knowledge management enables the execution of this strategy, with knowledge sharing processes not only addressing the skills gap, but also improving the quality of service that can be rendered to their clients. The use of codified knowledge in the form of standard document templates and documented legal opinions in turn improve response times and quality, also enabling better client service. This combined approach followed by Cedar & Kirk is a good example of how tacit knowledge shared

through interaction and socialisation, and explicit knowledge shared through codification, fulfil different roles, as emphasised by Cook and Brown (1999).

The firm's knowledge management strategy and approach to knowledge management thus appears to be well aligned. This is evident from the firm recently being named as the "Client Focused Law Firm of the Year – South Africa" by ACQ (Acquisition) Finance Magazine.

Connector 5 represents the alignment between Cedar & Kirk's combined knowledge management approach and operational control of knowledge management. As discussed in §7.5.3 Cedar & Kirk has a number of initiatives in place to formally promote a learning culture, for example the Legal English training programme, monthly case studies, legal opinion presentations and mentorship of directors of junior professionals. These operational controls are well aligned with the firm's approach to sharing tacit knowledge through interaction and socialisation. The approach to share codified knowledge is in turn supported by technology solutions that facilitate the use of standard document templates and documented legal opinions, which are used quite extensively throughout the firm. Incentives, as discussed in §7.5.4, are implemented in an incremental manner, with directors being rewarded for their contribution to the firm's knowledge base and for their mentoring role, while junior professionals are being rewarded for writing and publishing articles. Across the firm attorneys' work is also evaluated for conforming to the house style which is encapsulated in the standard document templates in the knowledge base. The incentive scheme for knowledge management activities thus support both the creation and use of explicit knowledge and the sharing of tacit knowledge.

It therefore would seem that the learning culture, incentives and technology components of knowledge management operations (System 3) are all aligned with the combined approach to knowledge management, which in turn is aligned with the knowledge management strategy (System 5). From an "organisations-as-systems" perspective this alignment of System 3 and System 5 highlights the viability of Cedar & Kirk's knowledge management initiative.

7.5.8 Emerging knowledge processes

Another comparative theme that was identified across all cases is "knowledge processes". Cedar & Kirk's knowledge processes can be described as emerging. This sub-theme emerged from sixteen statements, as illustrated in Figure 7.13.

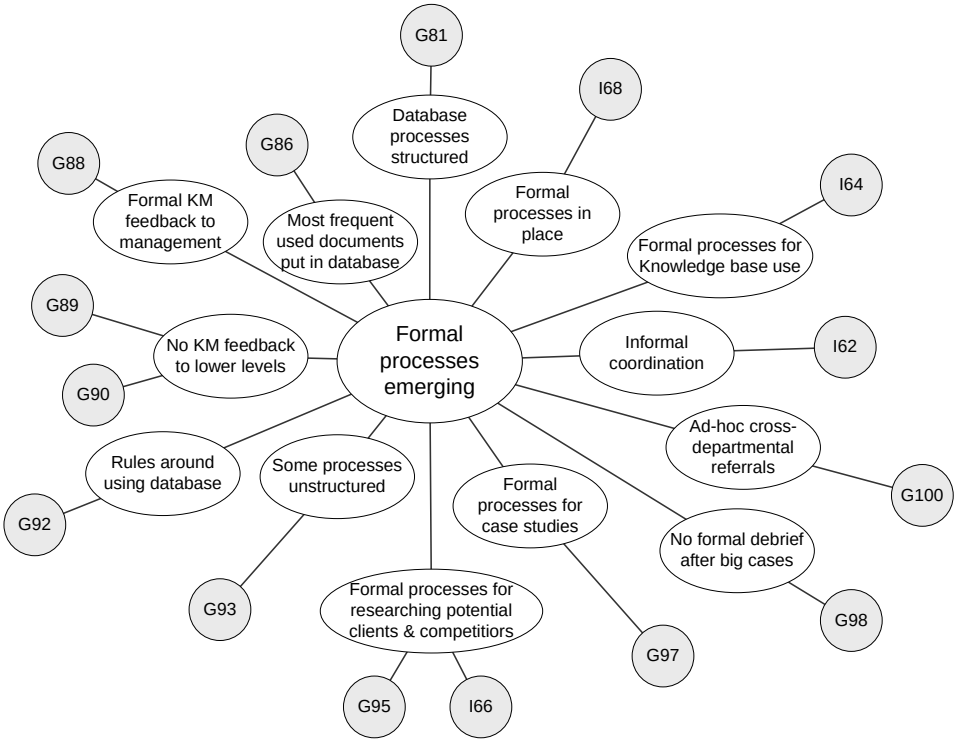


Figure 7.13: Emerging knowledge processes sub-theme

Systematic organisational processes are considered a key success factor in knowledge management (Skyrme & Amidon, 1997). This enables effective coordination which in turn is critical for an organisation's ability to survive and grow.

In Cedar & Kirk a number of formal knowledge processes has emerged as part of the knowledge management initiative. Knowledge usage processes include the prescribed use of standard document templates and definitions, while knowledge integration processes include the knowledge database where the standard document templates are stored, monthly case studies, as well as formal training programmes for candidate attorneys which include the Legal English course. Knowledge creation processes were considered unstructured, although on reflection, it emerged that more formal processes were in fact in place, although it did not form part of the knowledge management initiative. The director of knowledge management reminisced:

"Ja, it's actually interesting listening to you read that list, because I think we've always viewed knowledge management at Cedar & Kirk as being sort of professional knowledge. Knowledge of the law. Whereas listening to that list, it's actually quite interesting to note that knowledge management could also encompass knowledge of clients, what your

competitors are doing in terms of their business' strategies towards clients and that sort of thing". (Appendix D:I66).

Knowledge creation activities that are in place, be it under a different guise, include regular discussions about competitor's activities, people monitoring tenders being published, and research and presentations about potential clients.

The emergence of formal knowledge processes in Cedar & Kirk can be attributed to the extent of the operational control of knowledge management, as presented in Figure 7.14.

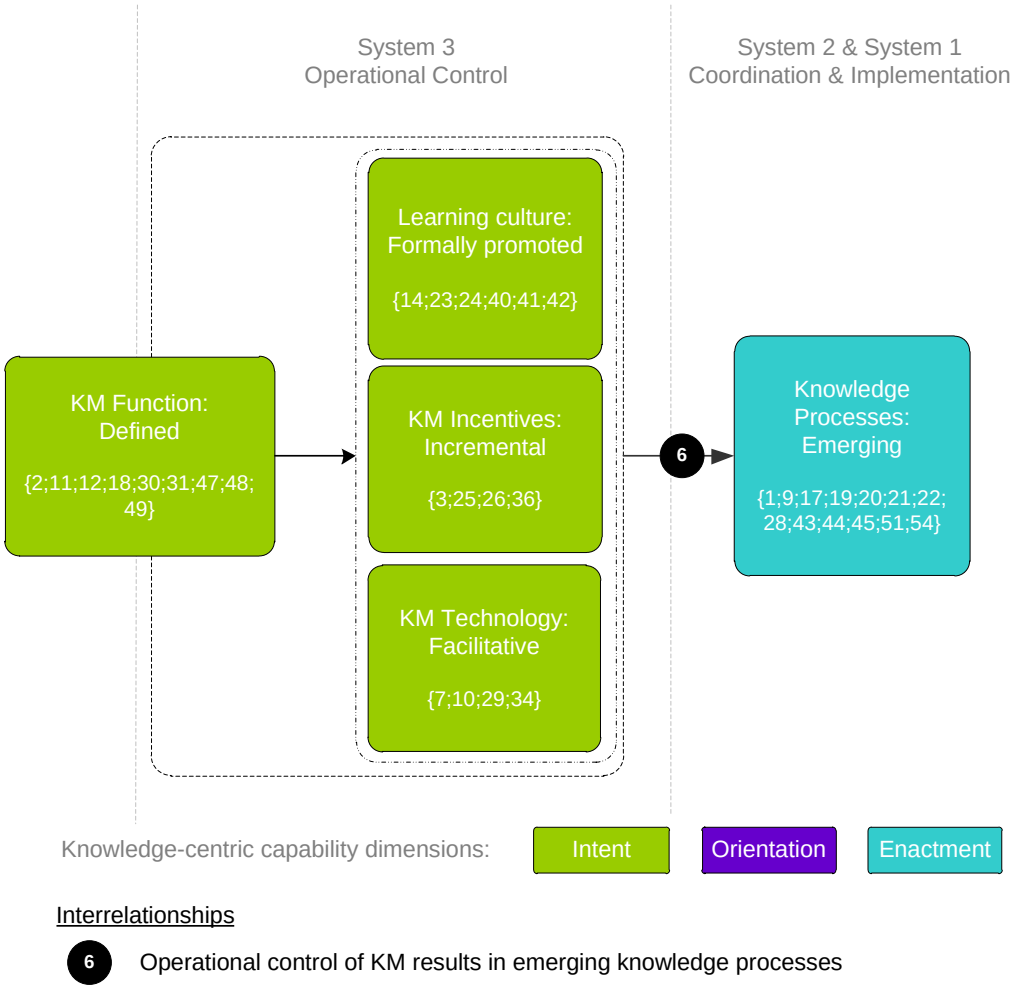


Figure 7.14: Interrelationship between operational control and knowledge processes

As discussed in §2.3.3, System 3 or the operational control function, is responsible for communicating a coordinated knowledge management plan to System 1 for implementation (Beer, 1994; Jackson, 2003). The presence of this control function in Cedar & Kirk has resulted in carefully coordinated knowledge processes.

7.5.9 Dynamic capabilities

The final comparative theme that was identified is “capabilities”. Cedar & Kirk’s ‘dynamic capabilities’ sub-theme emerged from three statements, as illustrated in Figure 7.15.

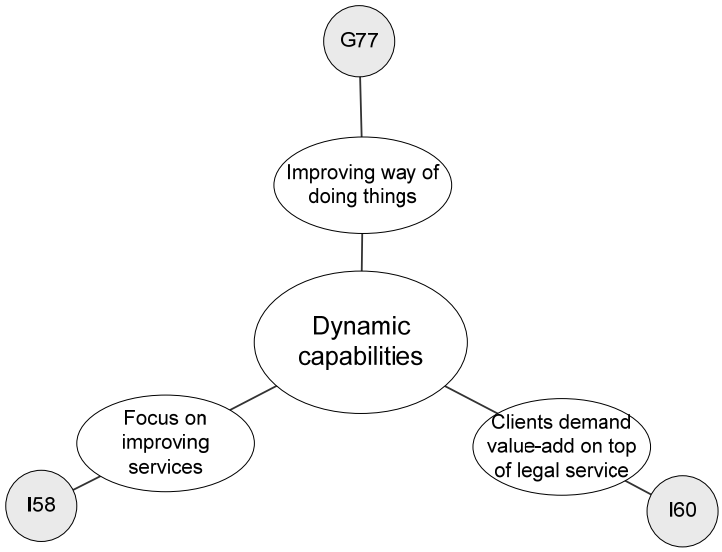


Figure 7.15: Dynamic capabilities sub-theme

Cedar & Kirk has been placing a lot of emphasis on continuously improving their service offering. In the legal services industry, superior client service is more or less the only way a firm can differentiate itself from its competitors. Cedar & Kirk has been fairly successful in this regard. Over the past three years the firm has received over 40 awards, many of which include global first tier rankings. During this time the firm was also named ‘Client Focussed Law Firm of the Year – South Africa’ by ACQ Acquisition Finance Magazine.

Table 7.2: Client Choice Award Criteria

Client choice award criteria
Quality of service
Value for money
Commercial awareness
Effective communication
Billing transparency
Tailored fee structures
Depth of team
Response time
Sharing of experise
Use of technology

Source: ("International Law Office," 2010)

Another important indicator of Cedar & Kirk's dynamic client service capability is the 'Client Choice Award – South Africa' awarded by the International Law Office. Firms were assessed using the criteria as presented in Table 7.2.

The quality of service criterion again indicates that Cedar & Kirk has managed to develop a dynamic capability in its client service offering. It is also of interest to note that other criteria, such as depth of team, in other words depth of expertise, response time, sharing of expertise and use of technology are all characteristics which were highlighted by the case analysis.

7.6 Conclusion

The purpose of this chapter was to explain why the Holistic capacity emerged in a specific organisational context. The Cedar & Kirk case study has shown that a number of interrelationships, summarised in Figure 7.16, plays a significant role in the emergence of a Holistic capacity within Cedar & Kirk's organisational context. Cedar & Kirk's intent to create a knowledge-centric environment, presented in green, is formally defined, providing the necessary structure to supply the firm with information about its total environment. The existence of a context for interpreting the environment enhances Cedar & Kirk's capacity for learning as well as its capacity to formalise a knowledge management strategy that enables the firm to align itself with changes in the environment. Cedar & Kirk's knowledge management initiative is further aided by the existence of a function that is producing an actionable plan for the operational aspects of knowledge management.

This is evident in the existence of a formally promoted learning culture, the incremental implementation of incentives for knowledge sharing and the facilitation role played by the firm's use of technology.

Cedar & Kirk's combination knowledge orientation, presented in purple, is well aligned with the firm's evolving strategy. Interactive knowledge sharing processes address the skills gap and improve the quality of service rendered to clients, while codified knowledge in the form of standard document templates and documented legal opinions improve response times and quality, all enabling a better client service.

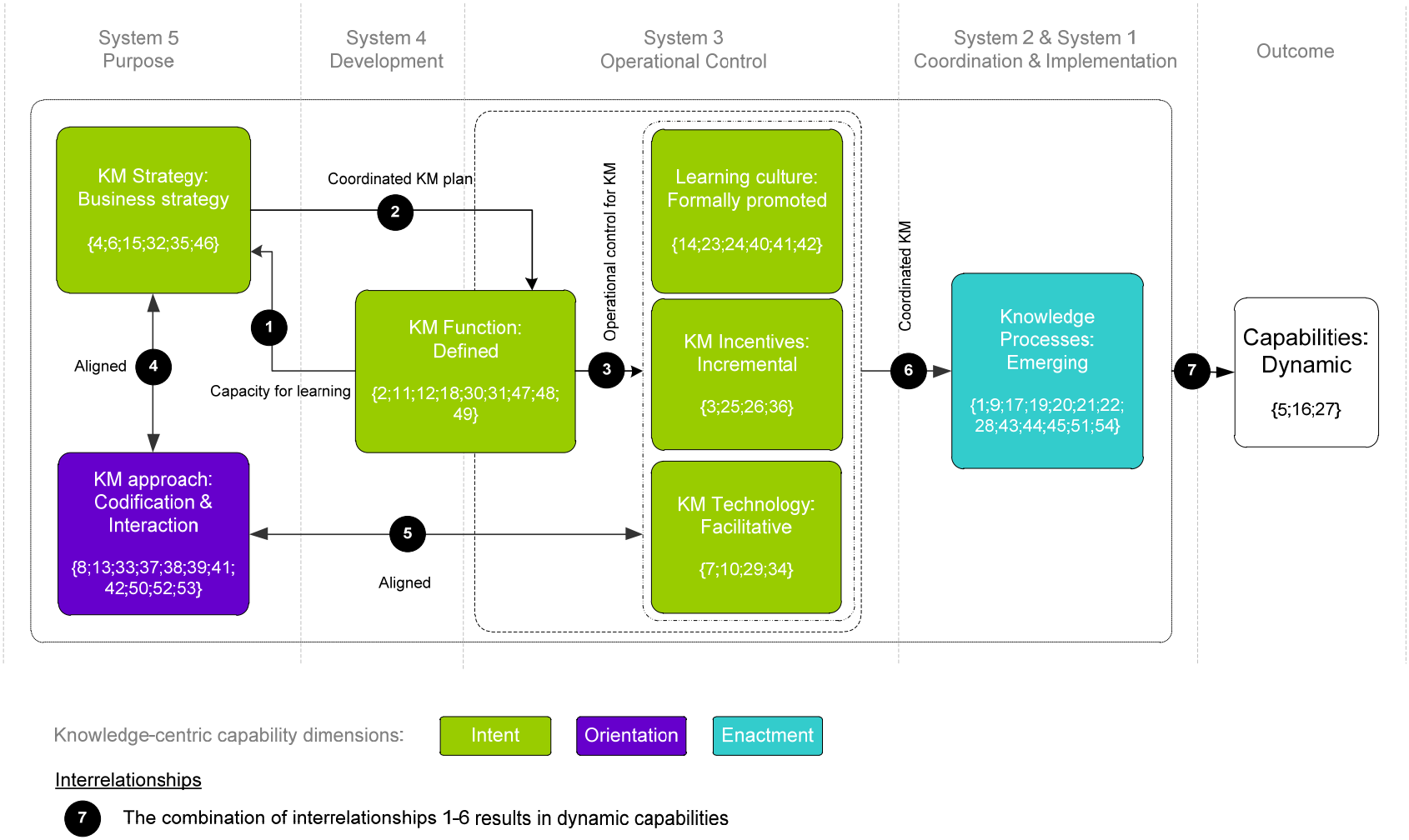


Figure 7.16: Emergence of Cedar & Kirk's dynamic capabilities

Finally, Cedar & Kirk's enactment of knowledge processes, presented in turquoise, is characterised by a number of formal processes, most notably knowledge usage and knowledge integration processes. Knowledge creation processes are largely unstructured, although more formal processes did emerge in this domain, be it under a different guise as knowledge management.

The interrelationships between these three dimensions of Cedar & Kirk's knowledge-centric capability thus explain the emergence of the Holistic capacity in the firm's organisational context.

CHAPTER 8
FUNDAMO: THE CASE OF A PERIPHERAL CAPACITY

"The sun's rays do not burn until brought to a focus".

Alexander Graham Bell

8.1 Introduction

The configuration of knowledge-centric capabilities of Cluster 2, identified in Chapter 5 and interpreted in Chapter 6, was labelled the Peripheral group because any knowledge management activities that occur seem to be by chance. Developing knowledge-centric capabilities doesn't appear to be of central importance to the members of this group. In this chapter the Peripheral capacity is discussed as an archetype of knowledge-centric organisations by presenting a case study to explain the emergence of a Peripheral capacity in a specific knowledge-intensive organisation.

8.2 Case selection

Thirteen organisations met the criteria, previously defined in §4.6.2, of a minimum of ten completed questionnaires. Three of those organisations met the combined criteria of having at least 35% of its observations in the Peripheral capacity with at least a 10% decrement to the closest group, as presented in Table 8.1.

Table 8.1: Organisations with primarily a peripheral capacity

		Holistic		Peripheral		Mechanistic		Roaming		
Company	**Industry**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**Total**
Mineco R&D	Resources	39.47%	15	13.16%	5	26.32%	10	21.05%	8	**38**
W1 Engineers	Consulting engineering	48.48%	16	6.06%	2	27.27%	9	18.18%	6	**33**
T1 Enigineers	Consulting engineering	24.00%	6	16.00%	4	24.00%	6	36.00%	9	**25**
FuturaSoft	Software services	40.91%	9	0.00%	0	4.55%	1	54.55%	12	**22**
Cedar & Kirk	Legal services	42.86%	9	9.52%	2	33.33%	7	14.29%	3	**21**
XactSoft	Software services	25.00%	5	20.00%	4	20.00%	4	35.00%	7	**20**
PharmaLab	Pharmaceutical	10.00%	2	50.00%	10	20.00%	4	20.00%	4	**20**
Z Partners	Legal services	30.77%	4	15.38%	2	23.08%	3	30.77%	4	**13**
PolyChem	Chemicals	7.69%	1	23.08%	3	46.15%	6	23.08%	3	**13**
Fourier Approach	Software services	25.00%	3	16.67%	2	0.00%	0	58.33%	7	**12**
F1 Engineers	Consulting engineering	45.45%	5	0.00%	0	9.09%	1	45.45%	5	**11**
Fundamo	Software services	0.00%	0	81.82%	9	9.09%	1	9.09%	1	**11**
X-Mobile	Software services	20.00%	2	50.00%	5	10.00%	1	20.00%	2	**10**
ChemWorx	Chemicals	25.00%	2	0.00%	0	37.50%	3	37.50%	3	**8**
X-Pharma	Pharmaceutical	40.00%	2	0.00%	0	20.00%	1	40.00%	2	**5**
PhantamSoft	Software services	0.00%	0	25.00%	1	25.00%	1	50.00%	2	**4**
Y Partners	Legal services	33.33%	1	33.33%	1	33.33%	1	0.00%	0	**3**
SFT-Ware	Software services	50.00%	1	0.00%	0	50.00%	1	0.00%	0	**2**
M-Connectiv	Software services	0.00%	0	100.00%	2	0.00%	0	0.00%	0	**2**
Secura	Software services	0.00%	0	0.00%	0	0.00%	0	100.00%	1	**1**
Total			**83**		**52**		**60**		**79**	**274**

The three organisations all indicated that they would consider participating in a case study. Two organisations, namely PharmaLab and X-Mobile could however not meet the deadlines to participate in the case study interviews. Fundamo was selected as the case study participant because an overwhelming majority of the responses, almost 82%, clustered in the Peripheral capacity, meaning Fundamo is the most representative case of a Peripheral capacity.

8.3 Case background

Fundamo is the world's largest global specialist provider of mobile financial services solutions. The company provides mobile banking and payment solutions which can be deployed by either mobile operators or banks. Fundamo's comprehensive enterprise mobile financial services platform comprises the Mobile Wallet, Mobile Banking, Mobile Remittance, Mobile Commerce and Mobile Debit Card modules.

Founded in 2000, the company has been a visionary in predicting the trend towards providing financial services through mobile phones, and the impact this will have on the financial services industry in both developed and developing markets, as illustrated in Figure 8.1.

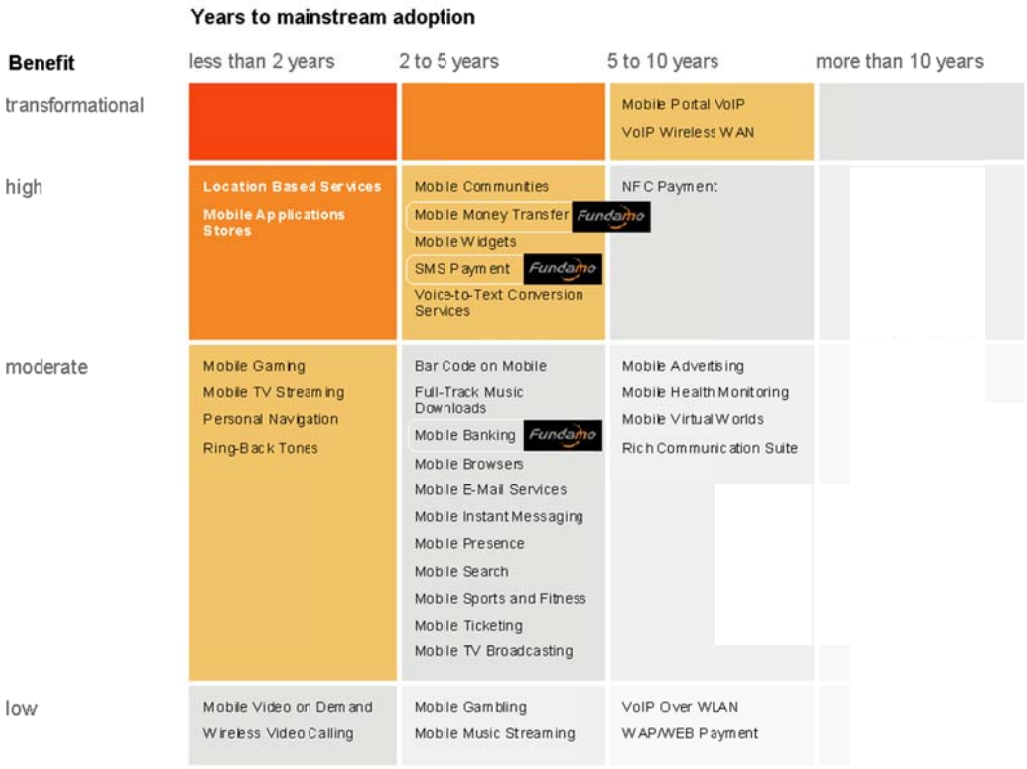


Figure 8.1: Priority matrix for consumer mobile applications

Source: Adapted from (Gartner, 2009)

Gartner's (2009) priority matrix for consumer mobile applications provides an overview of consumer mobile applications. The domains which Fundamo operates in, namely mobile money transfer, sms payment and mobile banking, has been highlighted. Each of the three domains is expected to achieve mainstream adoption within 2 to 5 years, with a moderate to high transformational impact on the industry. This gives an indication that Fundamo is a step-ahead of the expected changes in their industry.

Fundamo employs more than 150 employees and have successfully deployed more than 30 projects in over 20 countries. The company footprint is illustrated in Figure 8.2

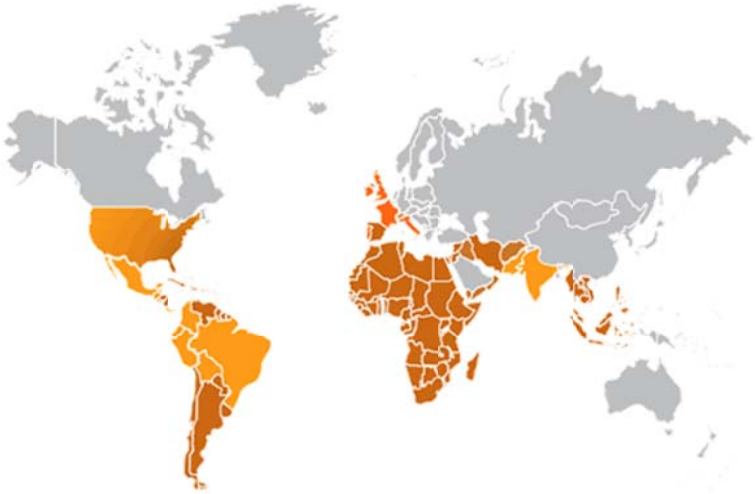


Figure 8.2: Fundamo's footprint

Source: (Fundamo, 2010)

Fundamo's solutions are tailored to emerging economies, more specifically to be utilised for customers who do not have access to financial services or bank accounts. The company is considered the market leader not only in Africa, but globally, with their technology being used more widely than any other supplier in the mobile financial services domain (Armitage, 2010; Gartner, 2009).

The company started out with four employees, and was committed to providing the best in class technology from its inception, with a strong emphasis on research and development. Fundamo prides itself on its specialised knowledge and expertise in the field of providing financial services to the poor, viewing it as a key differentiator. Fundamo is also performing well financially, boasting a 50% growth year-on-year, and recognise that such phenomenal growth could pose enormous challenges to the company in the future.

One area where the company is facing a real challenge is in putting initiatives in place to start managing the vast amount of knowledge that exists within the company. Fundamo does not have a formal knowledge management strategy or any formal knowledge management initiatives. During the time the company was still small with less than 50 employees, sharing knowledge on an informal, ad hoc basis was acceptable. The significant growth of the company over the past 2 years has made them realise that a more formal approach to knowledge management will be required.

A centralised file structure is used to store documents and templates, but no standard naming or versioning conventions are used, leaving employees to struggle to find a specific document, or once they have managed to locate it, having to guess which version of a document is the most recent.

8.4 Data analysis

The data for the case study were mainly collected through a semi-structured interview with the Chief Operations Officer and focus group sessions with four employees as well as the Managing Director who all participated in the knowledge management survey. The case study participants' survey responses clustered to Cluster 2, the Peripheral capacity.

The interview and focus group sessions were conducted in Fundamo's head office in Cape Town. Secondary data were obtained from company information available in the public domain, including the company's website and press releases.

Recordings of the interview and focus group session were transcribed using InqScribe and the transcripts of the interviews were coded in NVivo 8. Each of the codes formed the lower order themes, from which middle-order, case-specific themes were identified. Comparative higher order themes were identified across all four cases, while the case-specific themes vary from one case to the next, as illustrated below in Figure 8.3.

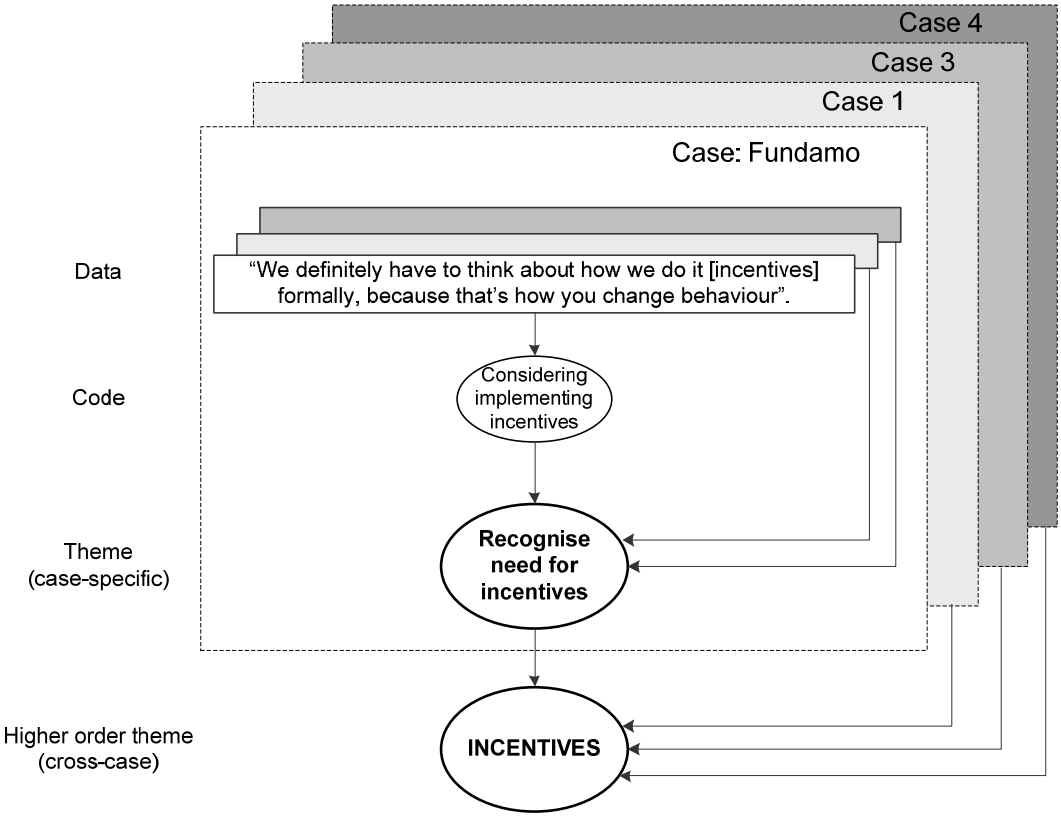


Figure 8.3: Example of the thematic analysis

Figure 8.4 illustrates the mapping of the comparative main themes, in the second tier, and the case-specific themes, in the third tier, to the three dimensions of the knowledge-centric capability framework in the first tier, and the five sub-systems of a viable system in the fourth tier. In analysing the data the emphasis fell on identifying the factors that influence the knowledge-centric capability of the organisation.

From the thematic analysis, five case-specific themes emerged in the Intent dimension of the knowledge-centric capabilities framework, namely Emerging strategy, Undefined structure, Emerging learning culture, Recognise need for incentives and Emerging technology. One theme, namely Combined knowledge approach, emerged in the Orientation dimension and one theme, Emerging knowledge processes, emerged in the Enactment dimension.

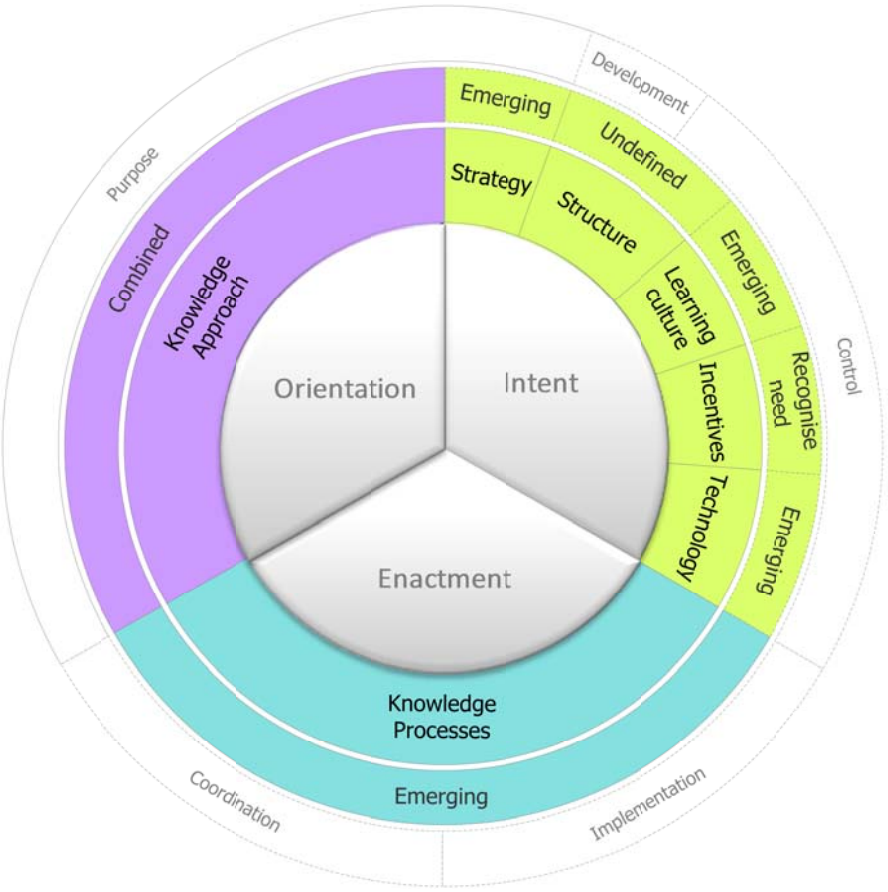


Figure 8.4: Thematic analysis of the Peripheral capacity of Fundamo

On their own, however, the themes do not tell much about the emergence of the Peripheral capacity. Next the chapter therefore turns to exploring and discussing the interrelationships between the various themes.

8.5 Discussion

8.5.1 Interrelationships

The discussion that follows explains why the Peripheral capacity emerged as a configuration of knowledge-centric capabilities in a specific organisational context, by exploring each of the themes and their interrelationships.

Themes are discussed on the hand of a graphical representation of the theme, as outlined in Figure 8.5. The theme is presented in the centre of the diagram, while the codes are presented in the middle-tier. The references to the data are presented in the outer-tier, with a ‘G’ referring to the focus group transcript and an ‘I referring to the interview transcript. The number following the ‘G’ or ‘I’ refers to the row in the corresponding transcript. The list of

codes is presented in Appendix H and the list of themes is presented in Appendix M. The transcripts are presented in Appendix D.

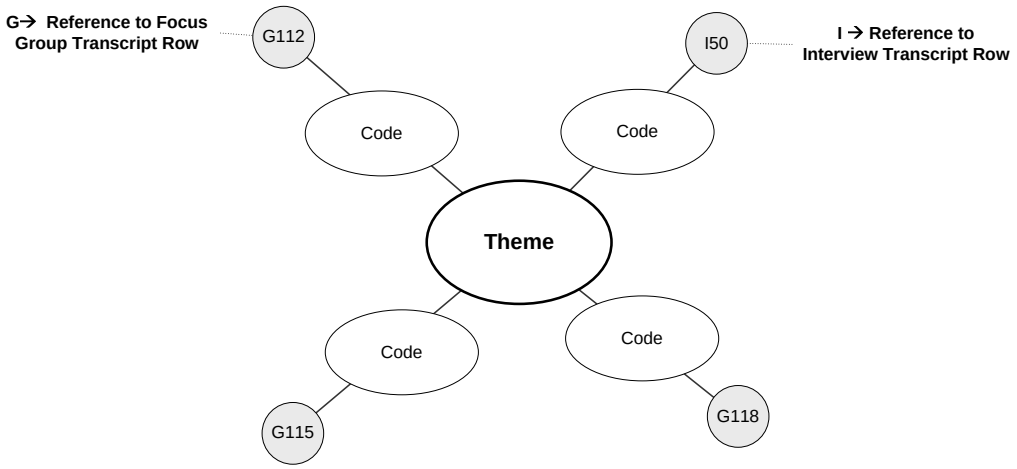


Figure 8.5: Anatomy of the theme representations

In order to provide a clear presentation of the interrelationships, the thematic analysis presented in Figure 8.4 is unpacked in an organising framework. This affords the opportunity to make sense of the data and case study themes within the dimensions of the knowledge-centric capability framework originally presented in §3.6, which also served as the theoretical base for the case study questions.

The interrelationships between the various themes that emerged in Fundamo are illustrated in Figure 8.6.

The mapping to the knowledge-centric capability framework is visible in the green blocks, representing the Intent dimension, the purple blocks, representing the Orientation dimension and the turquoise blocks, representing the Enactment dimension. The mapping to the 'organisation-as-a-viable-system' view is visible in the five sub-systems of the Viable Systems Model, namely Purpose, Development, Operational control, Coordination and Implementation.

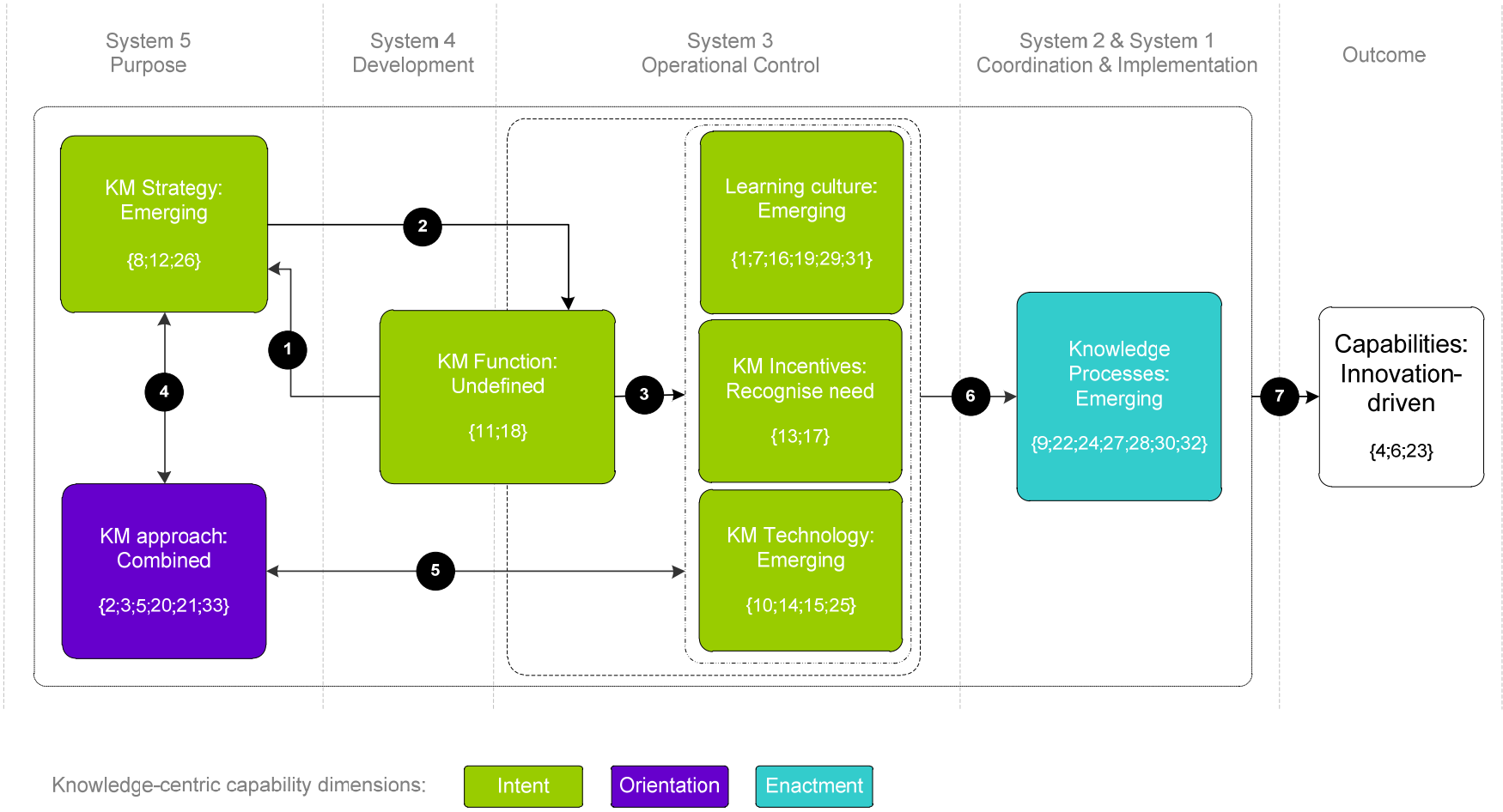


Figure 8.6: Interrelationships between Fundamo's themes

The codes from which the respective themes emerged are numbered within each theme block, while the interrelationships are represented by the black and white connectors, numbered one through seven.

Each of the themes and the respective interrelationships are discussed next.

8.5.2 An emerging knowledge management strategy

The first comparative theme that was identified is knowledge management strategy. In Fundamo this theme emerged as an emerging knowledge management strategy from five statements, as illustrated in Figure 8.7.

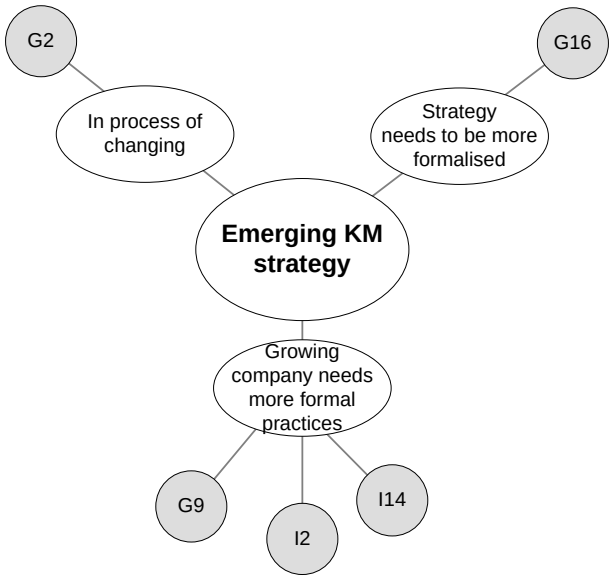


Figure 8.7: Emerging knowledge management strategy sub-theme

Fundamo has an emerging knowledge management strategy. No formal strategy is in place yet, but in principle the importance of knowledge management is understood. While the company was still small, it was relatively easy to share knowledge without a formal strategy in place. The company is however growing rapidly, making it more difficult to keep track of "who knows what", which highlights the need for a more formal approach to knowledge management. The operations manager explains:

> *"When we need to decide what we need to build into our product, we need to gather all the information from research from our sales teams and things like that, and put it together and then decide what our company's strategy is going to be and what our product strategy is going to be. What new features we want to add. And pulling that information together is easier if you're a smaller company. And we're growing now, so*

> *we're at a point where we need to find other ways of actually pulling the information into a certain structure so that everyone can actually put it together more easily from a wider range of sources." (Appendix E:I14).*

This thought is echoed by the CEO:

> *"I mean we're a start-up, and during the start-up phase we … nothing was formal and we were a bunch of people hunting together and we spoke to each other and it was very informal, but we are getting bigger now." (Appendix E:G9).*

The negative impact of the absence of a formal knowledge management strategy on organisational effectiveness is evident when looking at its knowledge sharing ability. One respondent explains:

> *"At the moment I ask a question and I have sort of learned where to find documents, but you end up finding ten different ones. And it takes me 5 hours to figure out which one is the latest, and there is never ONE that's the latest; so there are latest bits in all 10 documents; so it takes a huge amount of time to consolidate all of that into a single document that I can use." (Appendix E:G27-28).*

As discussed in §2.3.3, from a systems perspective a knowledge management strategy forms part of System 5, which is responsible for the direction of knowledge management within the company. It therefore seems that the lack of the critical System 5 components in Fundamo has a negative impact on organisational effectiveness.

8.5.3 An emerging learning culture

The second comparative theme that was identified is the learning culture of the organisation. The emerging nature of Fundamo's learning culture arose from twenty statements, as illustrated in Figure 8.8.

Fundamo has a number of activities in place that promote a learning culture. The most formal of these is pair programming, where an experienced developer is paired with a less experienced developer to share knowledge and to prevent the emergence of isolated pockets of expertise in the software platform. The company also supports employees who wish to further their studies after hours.

Informal activities include arranging talks by industry experts, and so-called brown-bag sessions, where any employee can arrange a lunchtime session to discuss his work.

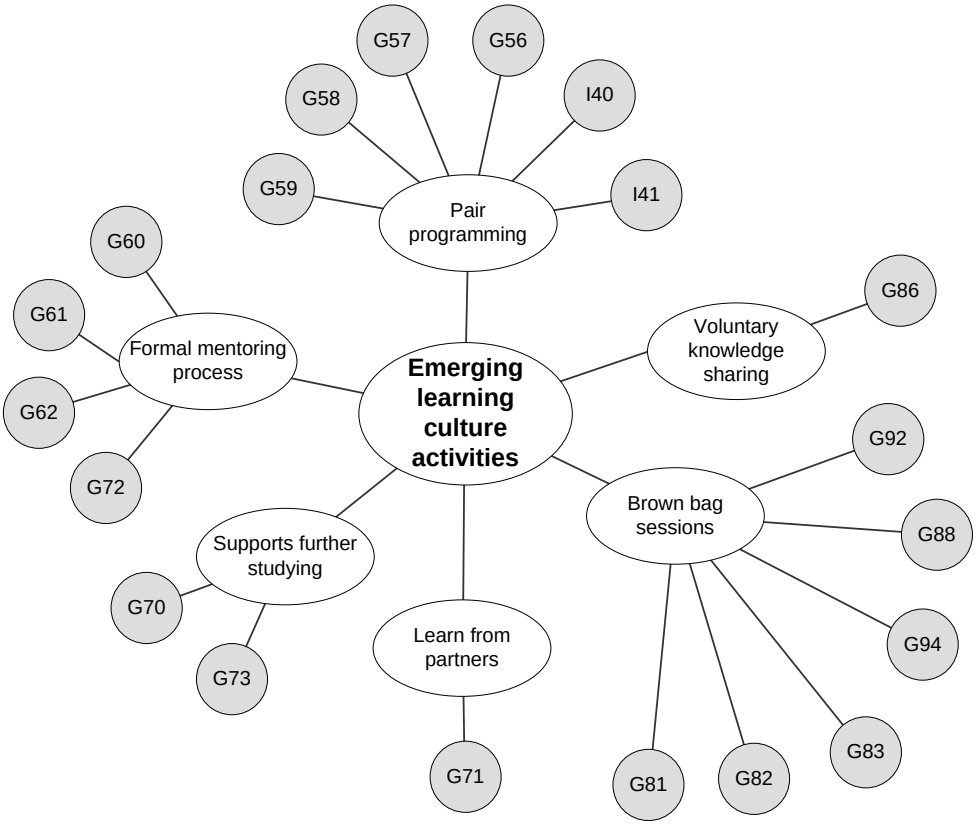


Figure 8.8: Emerging learning culture activities sub-theme

Another activity that contributes to the rising learning culture in Fundamo is the interaction with a number of larger companies, for example Accenture and S1. The CEO explains:

> *"I would say if there is a company in my perception that is very good at knowledge management, it is Accenture. And our exposure to them, we're working very closely with them, gives us perception. Even working with S1, you know. As a matter of fact the wiki was born out of S1; so our exposure to different companies and their view of things; it's almost like we see things that we like or that's applicable to us. I think that is a big stimulation for how we do things." (Appendix E:G73).*

This concurs with earlier findings (Desouza & Awazu, 2006; Robinson, 1982) that SMEs are particularly skilled at exploiting external sources of knowledge.

The learning culture can be described as emerging, because it is not yet aligned with a knowledge management strategy. The direction in which knowledge should be developed is not clearly indicated and since knowledge initiatives are only peripheral, regular feedback is not provided to employees.

Having said that, the learning activities that are in place seem to stimulate thinking and enable the identification of new opportunities, as suggested by Teece *et al.* (1997).

8.5.4 Recognising the need for incentives

Another comparative theme that was identified is “Incentives”. In Fundamo recognising need for incentives emerged as a sub-theme from five statements, as illustrated in Figure 8.9.

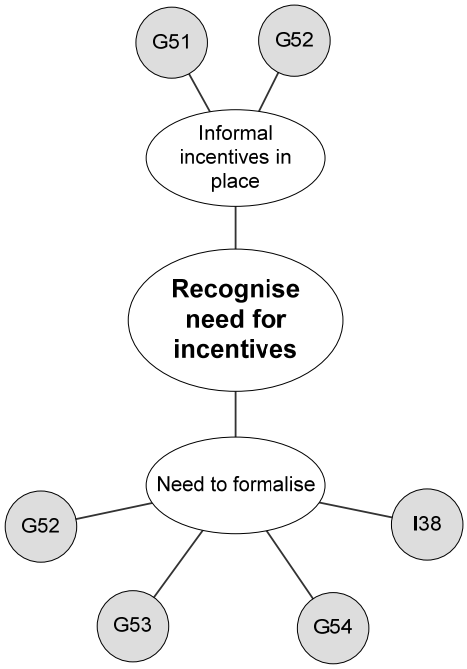


Figure 8.9: Recognition of need for incentives sub-theme

Although Fundamo does not have any incentives for creating, sharing or using knowledge, it is considered a necessary mechanism to change behaviour. The lack of incentives can be linked to the lack of a formal knowledge management strategy and structure, as evident in the words of the CEO:

> *“But we definitely have to think about how we do it formally, because that’s how you change behaviour. It can be monetary as well. I think it’s not bad to have it. I think the reason why it’s very difficult to incentivise it is because we don’t have structure around it.” (Appendix E:G52).*

From a systems perspective, the lack of incentives in Fundamo emphasises a weakness in System 3, as described in §2.3.3. System 3 needs to specify targets in terms of knowledge creation, sharing and use, and through the incentives, the auditing role of System 3 needs to ensure that these targets are being adhered to.

8.5.5 Emerging knowledge management technology

The fourth comparative theme that was identified is knowledge management technology. In Fundamo a subtheme of ‘emerging technology’ emerged from twelve statements, as illustrated in Figure 8.10.

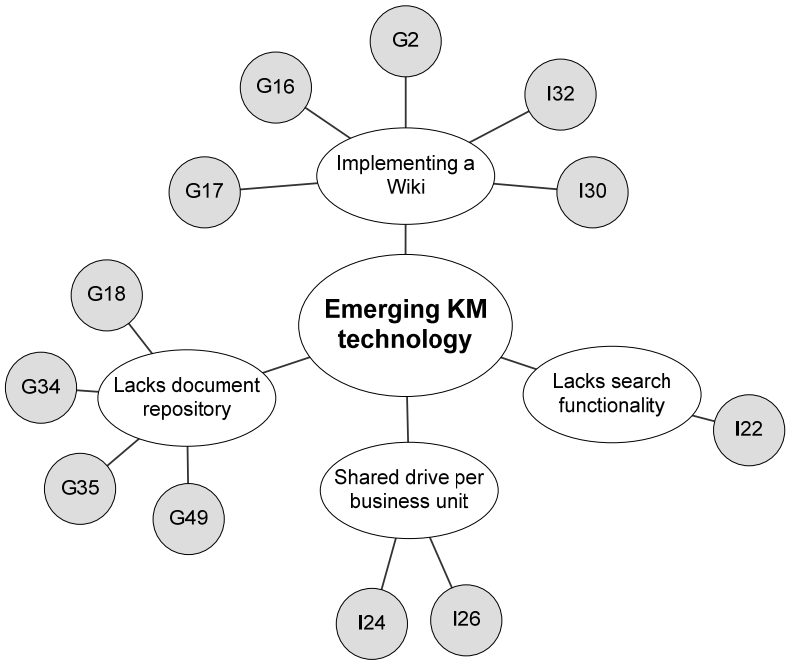


Figure 8.10: Emerging knowledge management technology sub-theme

At the time of the interview, Fundamo’s technology did not support knowledge sharing or knowledge integration effectively. Most of the business units only stored information in file structures on the network drive. Although everyone in the company has access to it, §8.3 mentioned that information is not stored in a standard manner across business units, rendering technology as a mechanism for knowledge sharing rather ineffective. The company was however in the process of deploying a wiki which would serve as an informal knowledge base where employees could share their thoughts and ideas.

The majority of Fundamo’s clients operate in developing countries in Africa and the Middle East, where internet infrastructure often is wanting. This means employees working at the client’s site need to document all relevant information on their laptops and synchronise the documents back to the file structure when they have access to the internet, or when they are back in South Africa. Moreover employees operate in a high-pressure environment. One of the regional executives explains:

> *"I left for Lagos on Tuesday morning, came back on Saturday at 11:00. Sunday I left at 00:00 for Bahrain, landed at 11:00, was picked up at 12:00 and started presenting the training at 13:00 until 18:00 the evening." (Appendix E:G42).*

This means that employees often do not get the time to synchronise their information back to the file structure in a timely manner. The CEO concurs:

> *"She gets new insights, documents it, presents it, and stores it somewhere on her laptop. And when she returns, she has something new to do, and she is not even out of her jetlag yet. And then she has to start sharing with us. That is a big challenge." (Appendix E:G49).*

The nature of Fundamo's operational environment and the conditions under which it operates highlights the challenge the company faces in using technology to capture and share knowledge, emphasising the importance of personal interaction in sharing and integrating knowledge. From a systems perspective this points to the challenge posed to the operational responsibility of System 3.

8.5.6 An undefined knowledge management function

The third comparative theme that was identified is knowledge management structure. The subtheme of an 'Undefined' knowledge management structure emerged from three statements, as illustrated in Figure 8.11.

In Fundamo the knowledge management structure is undefined, and the output, roles and responsibilities regarding knowledge management are not clearly communicated. The operations manager cites limited resources for the lack of a formal structure:

> *"We've always known we have a need for it, even if it's just to get the format of our documentation standard throughout the company and things like that. We've always been a little bit cash-strapped in terms of having to be able to appoint someone for that specific role." (Appendix E:G18).*

Most SMEs have resource constraints, pushing formal knowledge management structures to the periphery. From a systems perspective, the absence of a formal knowledge management function points to the absence of System 4 (Development) that has a dual responsibility as discussed in §2.3.3. System 4 has to provide a structure where the external and internal

knowledge is brought together, and it has to facilitate the processes aimed at creating, applying and integrating knowledge throughout the organisation.

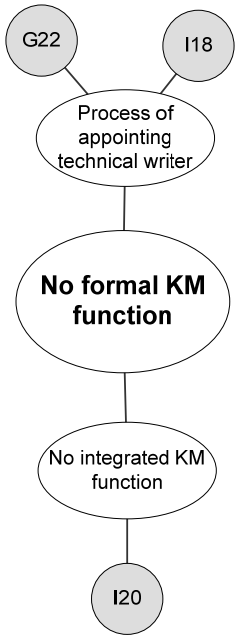


Figure 8.11: Undefined knowledge management structure sub-theme

Moreover the absence of System 4 also typically results in System 5 (Purpose) collapsing into System 3 (Control), causing System 5 to become overly concerned with day-to-day operations (Beer, 1984; Jackson, 2003). In Fundamo this is evident in the lack of integration between business units as far as knowledge activities are concerned:

> *"We have different business units. Inside each unit the way that information is stored there and stuff is, you know, in an informal way. It is structured, but just in that business unit. A different unit has a different way and another business unit does it a different way. The problem is getting information across those units. So the problem we probably have, well the biggest problem we have in the company is that people cannot find the information that is outside of their business area." (Appendix E:G20).*

It thus seems as if the lack of System 5 (Purpose) and System 4 (Development) in Fundamo results in business unit silos as far as knowledge sharing is concerned, giving rise to the first interrelationship, represented by connector 1 in Figure 8.12.

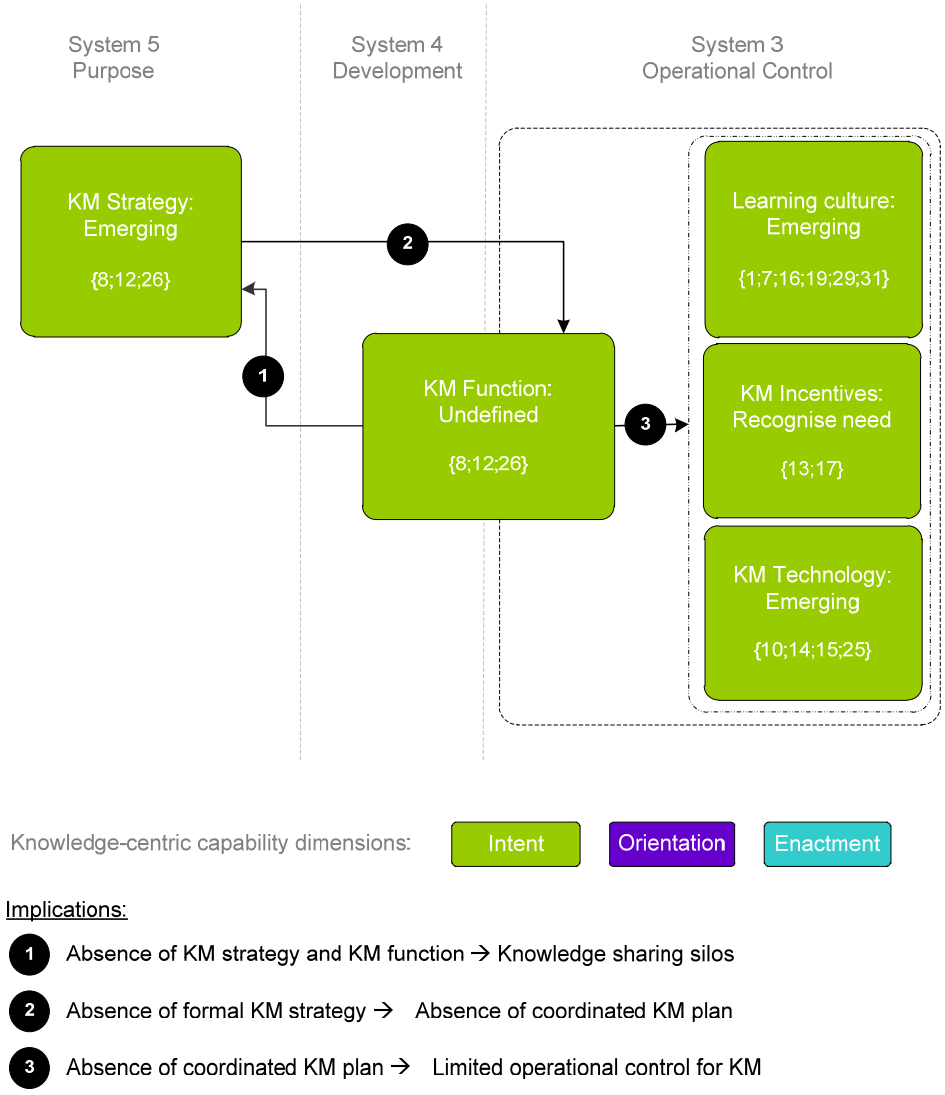


Figure 8.12: Interrelationships between purpose, development and control

The second interrelationship (connector 2) emerged between the undefined knowledge management strategy and the part of the knowledge management function responsible for operational control. The lack of a formal knowledge management strategy results in the absence of a coordinated knowledge management plan in Fundamo, which could explain why no standard document naming or versioning conventions are deployed across the different business units.

The third interrelationship, represented by connector 3, emerged between the undefined knowledge management function and three components of operational control, i.e. learning culture, incentives and technology. The discussion in §2.3.3 highlighted that, in a viable system, the operational control (System 3) is responsible for interpreting the strategy and

communicating it as a coordinated plan to business units for implementation (Beer, 1994; Jackson, 2003). In Fundamo no formal knowledge management function exists, resulting in the absence of a formally coordinated knowledge management plan.

Despite the lack of knowledge management coordination, Fundamo has an emerging learning culture. This can probably be attributed to the fact that, until recently, Fundamo could be classified as a startup company that invested most of its resources into researching concepts, technologies and markets. This in turn created huge amounts of knowledge, which was easily shared in an informal manner while the company was small. With the significant growth of the company, from 4 to more than 150 employees in ten years, informal knowledge sharing has become unsustainable, leaving the company to start looking at ways to manage its wealth of knowledge in a more formal manner.

8.5.7 A combined knowledge management approach

The fifth comparative theme that was identified is 'knowledge management approach'. The 'Codification and interaction' subtheme emerged from twenty statements, as illustrated in Figure 8.13.

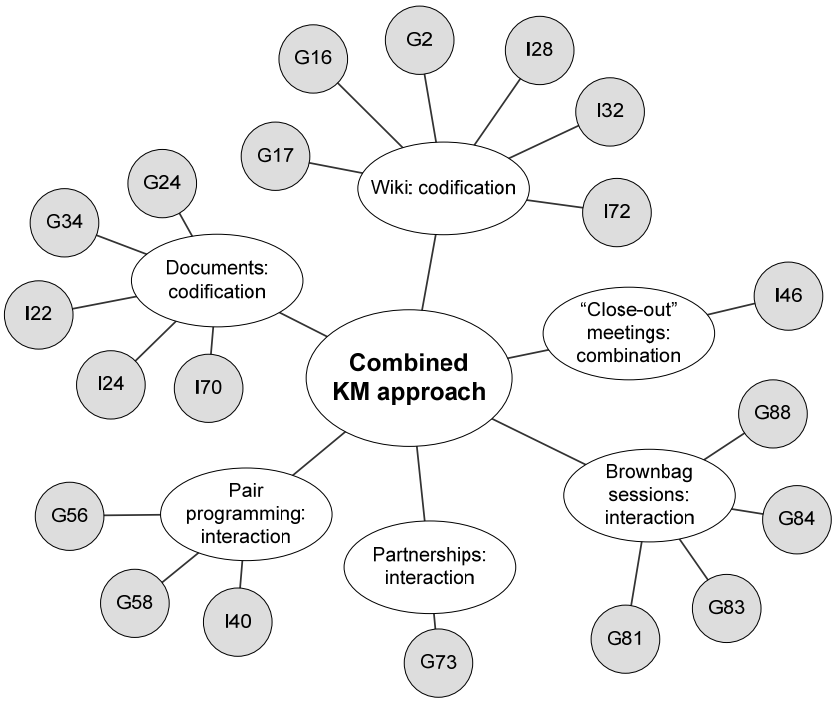


Figure 8.13: Combined approach to KM sub-theme

Unwittingly, Fundamo's approach to knowledge management includes both codification and personal interaction activities. As part of the codification approach, electronic file structures

are used to store and share important documentation, while the wiki will be used as an informal platform for sharing knowledge. The strength of Fundamo's knowledge sharing activities, however, is in the sharing and integration of tacit knowledge. Interactive activities such as pair-programming, the brown-bag sessions, and working closely with external experts affords Fundamo the opportunity to create variety in their internal environment which ultimately leads to the emergence of novelty and the creation of new knowledge (Foss & Christensen, 2001).

The combined approach results in interrelationships between strategy, approach and technology, as presented respectively by connector 4 and 5 in Figure 8.14.

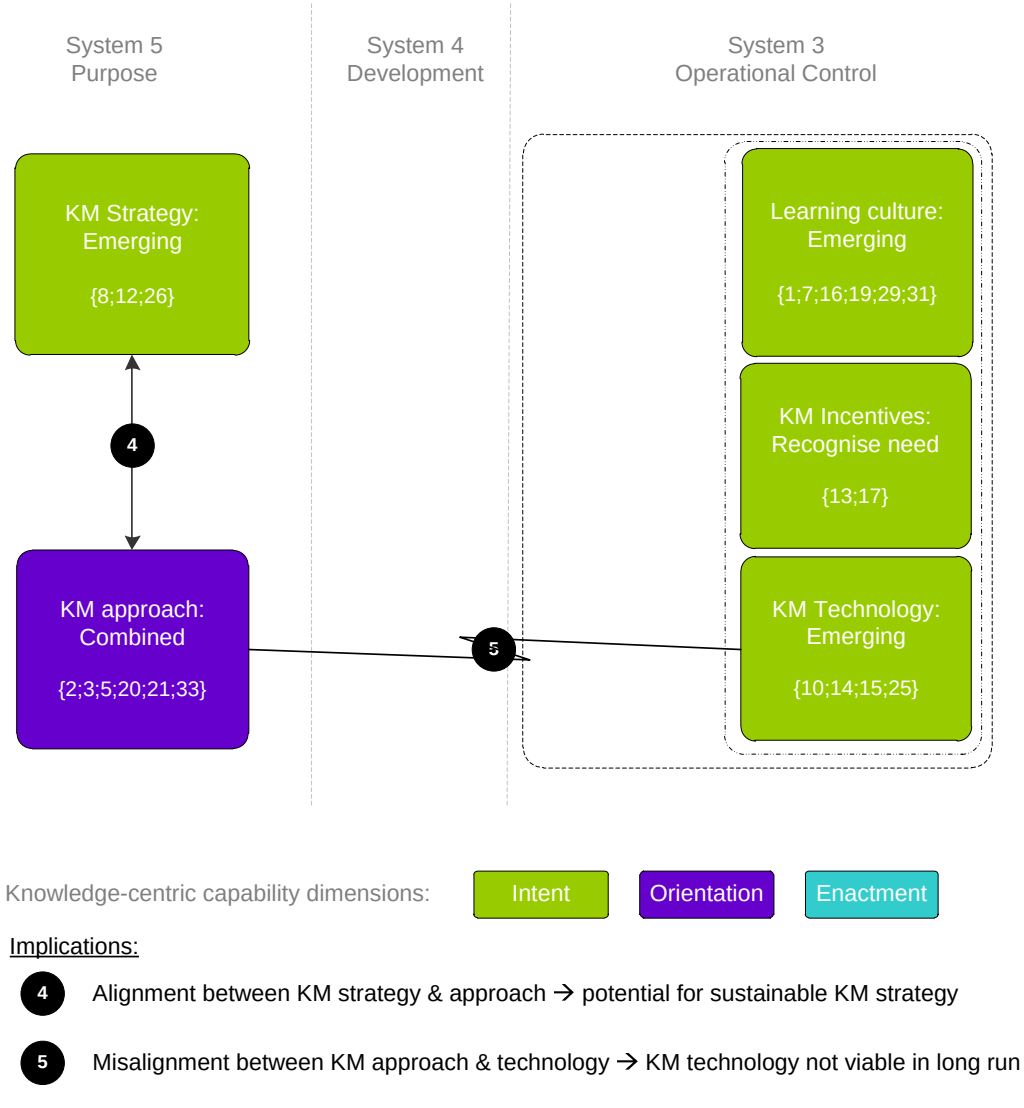


Figure 8.14: Interrelationships between strategy, approach and operations

The alignment between Fundamo's combined knowledge approach and its business goal of developing its expertise, knowledge and experience, is represented by connector 4. Although Fundamo doesn't have a formal knowledge management strategy, the company views its knowledge, experience and expertise as the core of its competitive advantage (Armitage, 2010). A knowledge approach balanced between tacit and explicit knowledge, each fulfilling different epistemological roles (Cook & Brown, 1999), thus supports Fundamo's business goal.

Knowledge codification is part of Fundamo's combined knowledge approach. The technology deployed by Fundamo for this purpose does however not support the knowledge codification sufficiently. The current file structure deployed for storing information is totally inadequate, resulting in employees spending a lot of time looking for the right documentation. Fundamo's distributed work environment, which includes areas with no internet access, poses a challenge to finding an appropriate technological solution to sharing codified knowledge, while keeping it current. Fundamo's current use of technology for knowledge creation and knowledge sharing thus is not viable in the long term.

8.5.8 Emerging knowledge processes

Another comparative theme that was identified is "knowledge processes". Fundamo's knowledge processes are emerging. This subtheme was identified from ten statements, as illustrated in Figure 8.15.

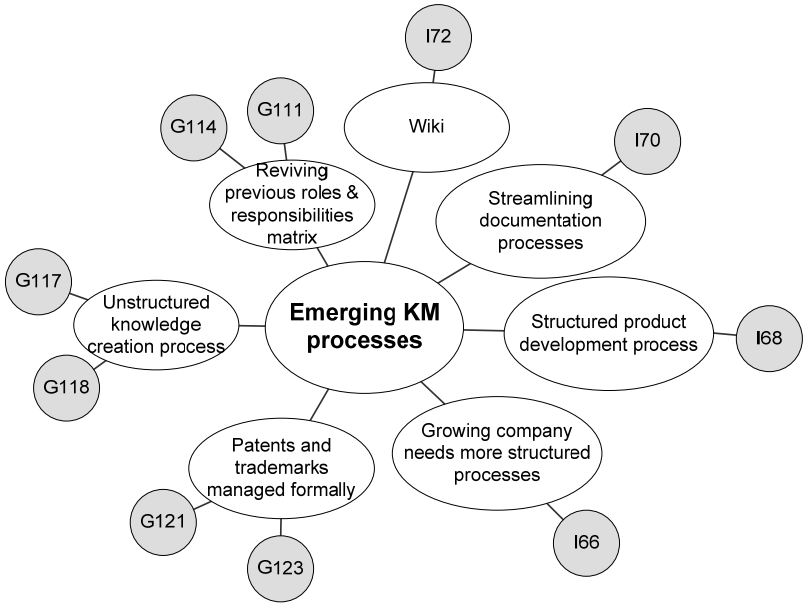


Figure 8.15: Emerging knowledge processes sub-theme

Fundamo's knowledge processes are largely unstructured, but certain mechanisms are being put in place to formalise some of the processes. This is represented by connector 6 in Figure 8.16. Again the reason the processes were unstructured, is because Fundamo was a small company and employees knew who knows what. The company is however growing significantly, and a skills matrix has been put in place as a coordination mechanism. Knowledge use processes, for example the process to decide which features will go into a product next, is more formal, from managing the information sources, to prioritising and deciding on features. Knowledge creation processes are however again largely unstructured.

Knowledge processes enable knowledge to flow through an organisation by leveraging the infrastructure such as knowledge management structures, technology and the learning culture (Appleyard, 1996; Gold, *et al.*, 2001).

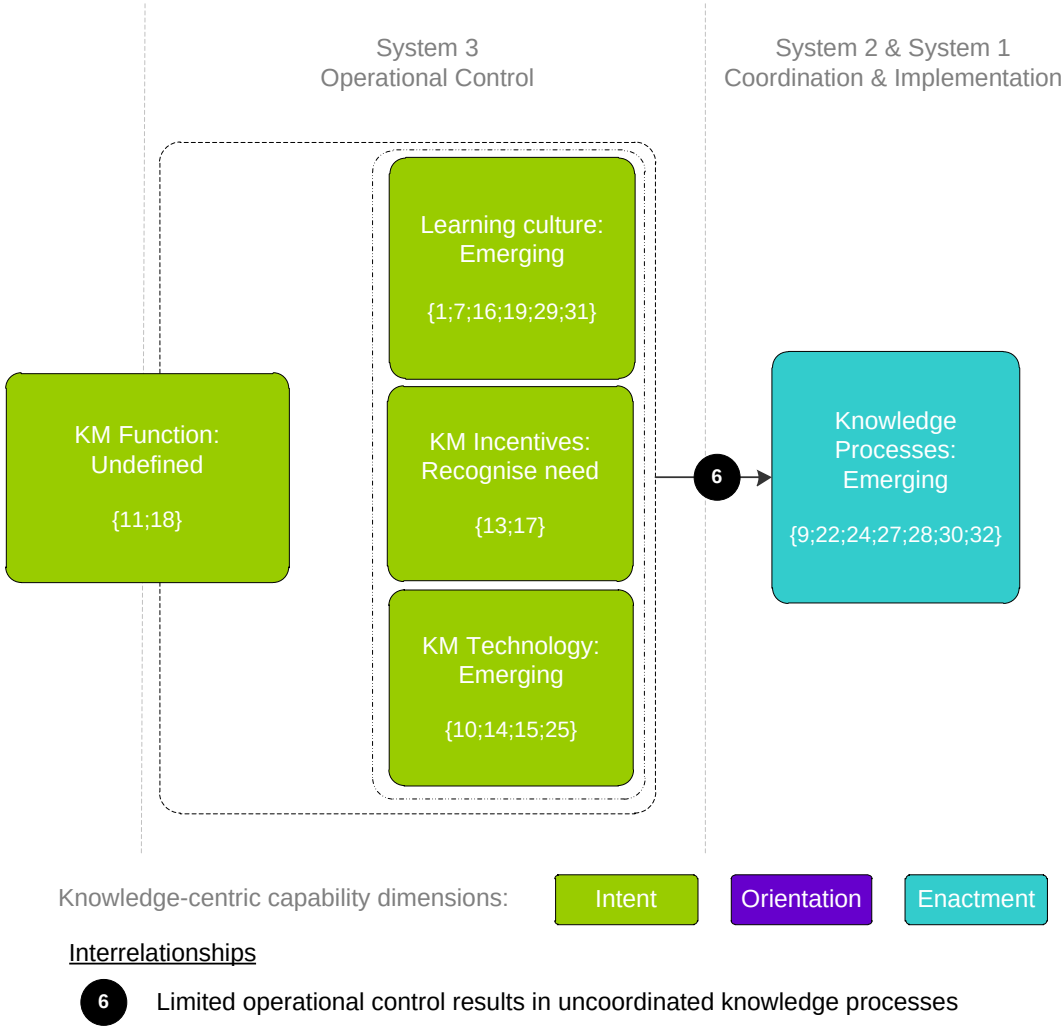


Figure 8.16: Emerging knowledge processes

Knowledge processes also influence an organisation's ability to integrate, build, and reconfigure internal and external competencies rapidly. Informal knowledge coordination and knowledge creation processes will therefore inhibit the sustainability of this capability.

8.5.9 Innovation-driven capabilities

The final comparative theme that was identified is "capabilities". Fundamo's 'dynamic' subtheme emerged from seven statements, as illustrated in Figure 8.16.

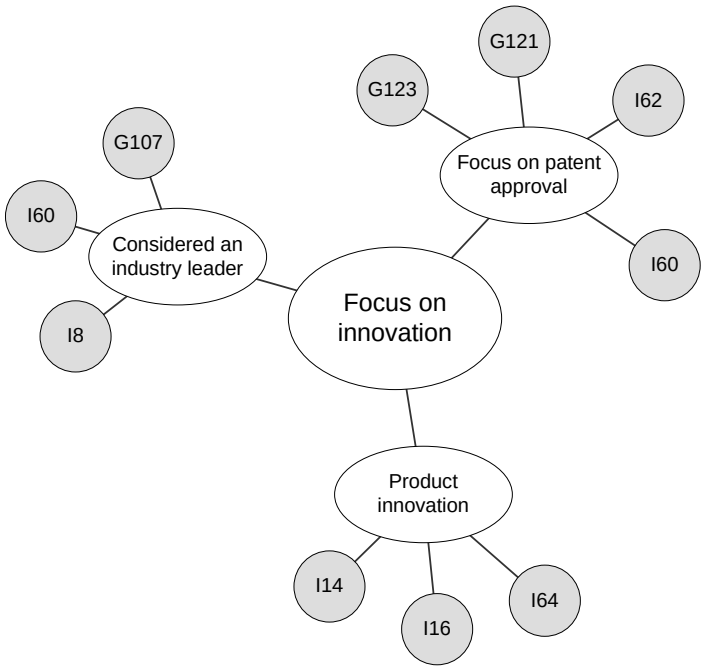


Figure 8.17: Dynamic capabilities sub-theme

Fundamo's capability is centred on its technical innovation ability. The company invests around 35% of annual revenues in research and development to ensure that it maintains its leadership position. Its innovative ability is evident in the numerous local and international nominations and awards it has received for its mobile payment platform as well as a R36m investment by HBD Venture Capital in 2007. More than 30 registered patents provide further evidence of the dynamic technical innovation capability of the company.

While a lack of knowledge coordination and informal knowledge processes could inhibit the sustainability of an organisation's ability to build competencies, it doesn't seem to have had a negative impact on Fundamo's dynamic technical innovation capability yet. This can probably be attributed to the fact that as a start-up company, Fundamo initially spent a lot of time creating knowledge by researching concepts, technologies and markets. Now that the

company is going through a period of rapid growth, the long terms sustainability of the capability could be put under pressure, prompting the company to start exploring knowledge management as an avenue for creating a capability that will be sustainable in the long term.

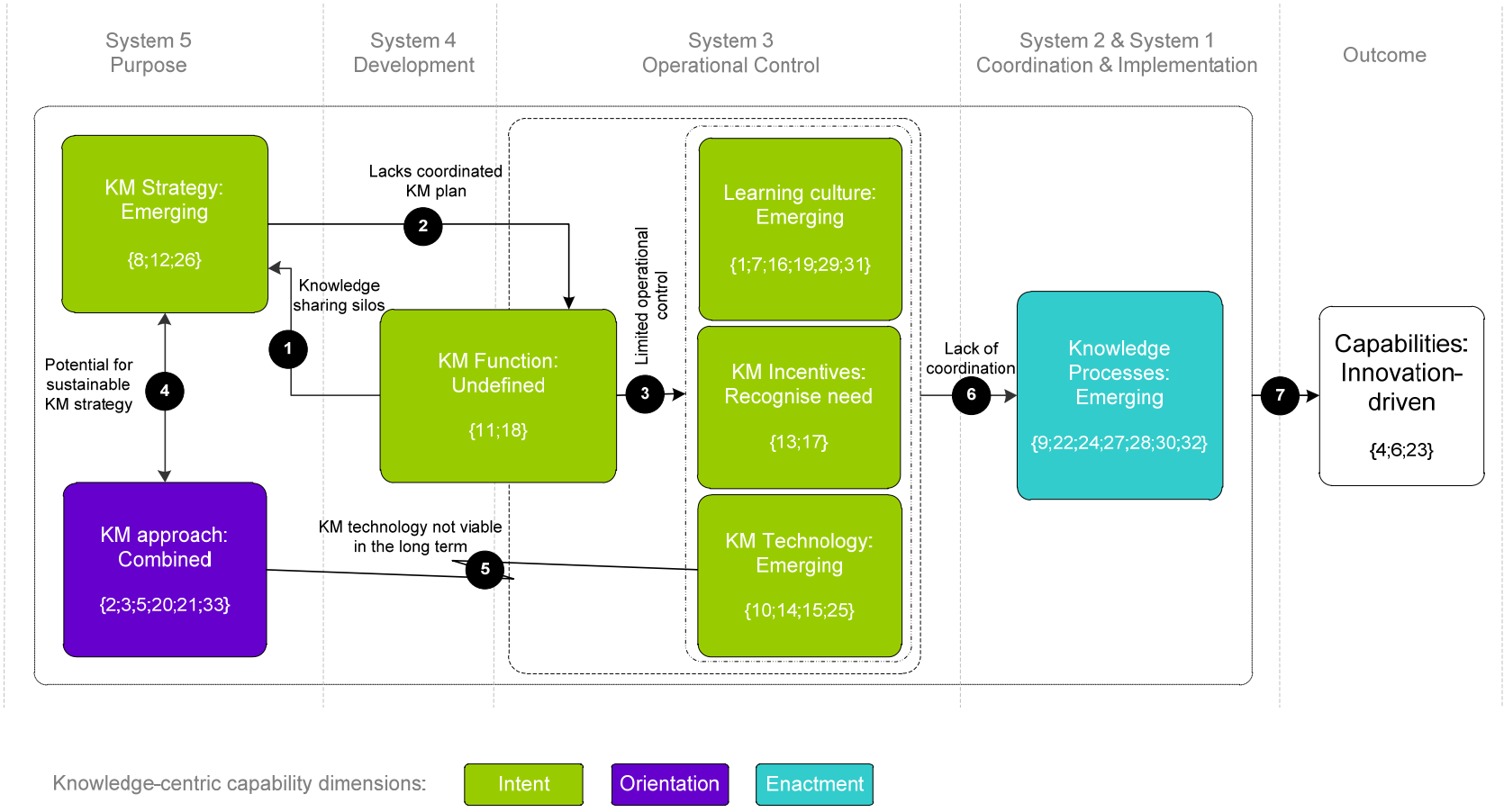
8.6 Conclusion

The purpose of this chapter was to explain why the Peripheral capacity emerged in a specific organisational context. The Fundamo case study has shown that a number of interrelationships, summarised in Figure 8.18, play a significant role in the emergence of a Peripheral capacity within Fundamo's organisational context.

Fundamo's intent to create a knowledge-centric environment, represented in green, has not been part of the company's central focus, despite the fact that the company views knowledge, experience and expertise as a key differentiator. With the recent rapid growth of the company, they have come to realise that a more formalised approach to knowledge management could assist the company in creating a knowledge-centric environment that will support its longer-term business goals. While a knowledge management strategy is emerging along with a learning culture, and the need for incentives is recognised, Fundamo doesn't have a formal knowledge management function required to coordinate knowledge activities between the different business units.

Fundamo's combined knowledge orientation, represented in purple, is aligned with the business goal of developing knowledge, experience and expertise. A misalignment does however exist between the knowledge orientation, more specifically the creation, sharing and use of explicit knowledge, and the technology deployed for supporting it. Finally, Fundamo's enactment of knowledge processes, represented in turquoise is largely unstructured, although a few formal knowledge processes are emerging.

The interrelationships between the three dimensions of Fundamo's knowledge-centric capability thus explain the emergence of the Peripheral capacity in the company's organisational context.



Interrelationships

7 The combination of interrelationships 1-6 results in dynamic capabilities

Figure 8.18: Emergence of Fundamo's innovation-driven capabilities

CHAPTER 9
POLYCHEM: THE CASE OF A MECHANISTIC CAPACITY

"Men have become the tool of their tools".

Henry David Thoreau

9.1 Introduction

In Chapter 6 the configuration of knowledge-centric capabilities of Cluster 3 was labelled a Mechanistic capacity mostly because the cluster has a strong focus on using technology to support knowledge management, while no incentives are in place to encourage the creation, sharing and use of knowledge. In this chapter the Mechanistic capacity is discussed as an archetype of knowledge-centric organisations, using a case study to explain why the Mechanistic capacity emerged as a configuration of knowledge-centric capabilities in a specific organisation in more detail.

9.2 Case selection

Thirteen organisations met the criteria, previously defined in §4.6.2, of a minimum of ten completed questionnaires. Only one organisation however met the combined criteria of having at least 35% of its observations in the Mechanistic group with at least a 10% decrement to the closest group, as presented in Table 9.1. PolyChem[2] was thus the only qualifying case study participant for the Mechanistic group.

Table 9.1: Organisations with primarily a Mechanistic capacity

		Holistic		Peripheral		Mechanistic		Roaming		
Company	**Industry**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**Total**
Mineco R&D	Resources	39%	15	13%	5	26%	10	21%	8	**38**
W1 Engineers	Consulting engineering	48%	16	6%	2	27%	9	18%	6	**33**
T1 Enigineers	Consulting engineering	24%	6	16%	4	24%	6	36%	9	**25**
FuturaSoft	Software services	41%	9	0%	0	5%	1	55%	12	**22**
Cedar & Kirk	Legal services	43%	9	10%	2	33%	7	14%	3	**21**
XactSoft	Software services	25%	5	20%	4	20%	4	35%	7	**20**
PharmaLab	Pharmaceutical	10%	2	50%	10	20%	4	20%	4	**20**
Z Partners	Legal services	31%	4	15%	2	23%	3	31%	4	**13**
PolyChem	Chemicals	8%	1	23%	3	46%	6	23%	3	**13**
Fourier Approach	Software services	25%	3	17%	2	0%	0	58%	7	**12**
F1 Engineers	Consulting engineering	45%	5	0%	0	9%	1	45%	5	**11**
Fundamo	Software services	0%	0	82%	9	9%	1	9%	1	**11**
X-Mobile	Software services	20%	2	50%	5	10%	1	20%	2	**10**
ChemWorx	Chemicals	25%	2	0%	0	38%	3	38%	3	**8**
X-Pharma	Pharmaceutical	40%	2	0%	0	20%	1	40%	2	**5**
PhantamSoft	Software services	0%	0	25%	1	25%	1	50%	2	**4**
Y Partners	Legal services	33%	1	33%	1	33%	1	0%	0	**3**
SFT-Ware	Software services	50%	1	0%	0	50%	1	0%	0	**2**
M-Connectiv	Software services	0%	0	100%	2	0%	0	0%	0	**2**
Secura	Software services	0%	0	0%	0	0.00%	0	100%	1	**1**
Total			**83**		**52**		**60**		**79**	**274**

[2] PolyChem is a pseudonym. The company requested to remain anonymous.

9.3 Case background

PolyChem started in 1974 as a Nylon waste fibre sorting and repacking operation, mainly for export. In 1975 the company bought its first extruder and started adding more value to the fibre by reprocessing it into a general-purpose injection-moulding compound.

Today PolyChem is a member of the largest specialty chemical operation in South Africa, which has more than twenty subsidiaries and joint ventures supplying a broad spectrum of industry with a variety of chemicals, raw materials and services. As an autonomous subsidiary, PolyChem plays a leading role in the manufacture and supply of thermoplastic compounds to a diverse range of industries for the South African and selected export plastic conversion markets. These industries include the automotive, electric and electronics, industrial, consumer and packaging industries. In the light of the challenging global economic conditions in 2008, PolyChem implemented various cost-saving projects and focused on applications in new markets, forging new relations in the East. As part of its global approach to innovation it has, together with its key licensors and partners, expanded its offerings into new areas such a metal replacement, extrusion and specialised packaging applications.

Some key initiatives launched recently further include extending its export operations with products supplied for the first time into East Africa, contributing to the success of the 2010 FIFA World Cup by compounding and colouring polypropylene and polyamide for the seating at new football stadiums (Figure 9.1) and strengthening its presence in Gauteng, South Africa.

Figure 9.1: New football stadium seating supplied by PolyChem

As an independent compounder, technology is sourced internationally and also from its own in-house research and development capabilities. Among others, PolyChem has licensing agreements with DuPont and Dow Automotive. From a quality perspective, PolyChem is ISO 9001:2000 compliant and in the process of obtaining ISO TS16949:2000 accreditation. The company is also subjected to regular audits by DuPont and Dow Automotive.

Ensuring the safety of employees, contractors and visitors to the company's site remains another priority, and PolyChem retained its NOSA Five Star Platinum grading during 2008. At that point the company boasted 1.5 million man-hours without a disabling injury. The development of expertise and focus on customer service excellence are considered key driving forces of the business. PolyChem employs 162 people, although it was in the midst of a retrenchment process during the time of the interviews. The company's compounding facilities and laboratories are in Cape Town, while the sales and distribution facilities are in all major centres of South Africa.

PolyChem's knowledge management initiative is built around centralised repositories, basically comprising three Lotus Notes databases. The customer relations management database is used to capture all information pertaining to customer visits, lessons learned, customer complaints, product development, and technical service requests. The quality database is used to manage Ministerial Safety Data Sheets, the ISO 9001 system, the ISO TS16949 system and the health and safety system. The third database is used for financial management, balanced scorecard, KPI management and dashboards. The knowledge repositories are workflow-driven, which means it is used at an operational level to facilitate the flow of information from one employee to the next, and from one team to the next. The Systems and Training manager is responsible for the implementation of the databases.

9.4 Data analysis

The data for the case study were mainly collected through a semi-structured interview with the Systems and Training manager and a focus group session with employees who also participated in the knowledge management survey.

The interview and focus group session were conducted in PolyChem's head office in Cape Town. Secondary data were obtained from company information available in the public domain, including the company's website and press releases. Video recordings of the interview and focus group sessions were transcribed using InqScribe and the transcripts were coded using NVivo 8. Each of the codes formed lower order themes, from which middle-

order case-specific themes were identified. Comparative higher order themes were identified across all four cases, while case-specific themes vary from one case to the next, as illustrated below in Figure 9.2.

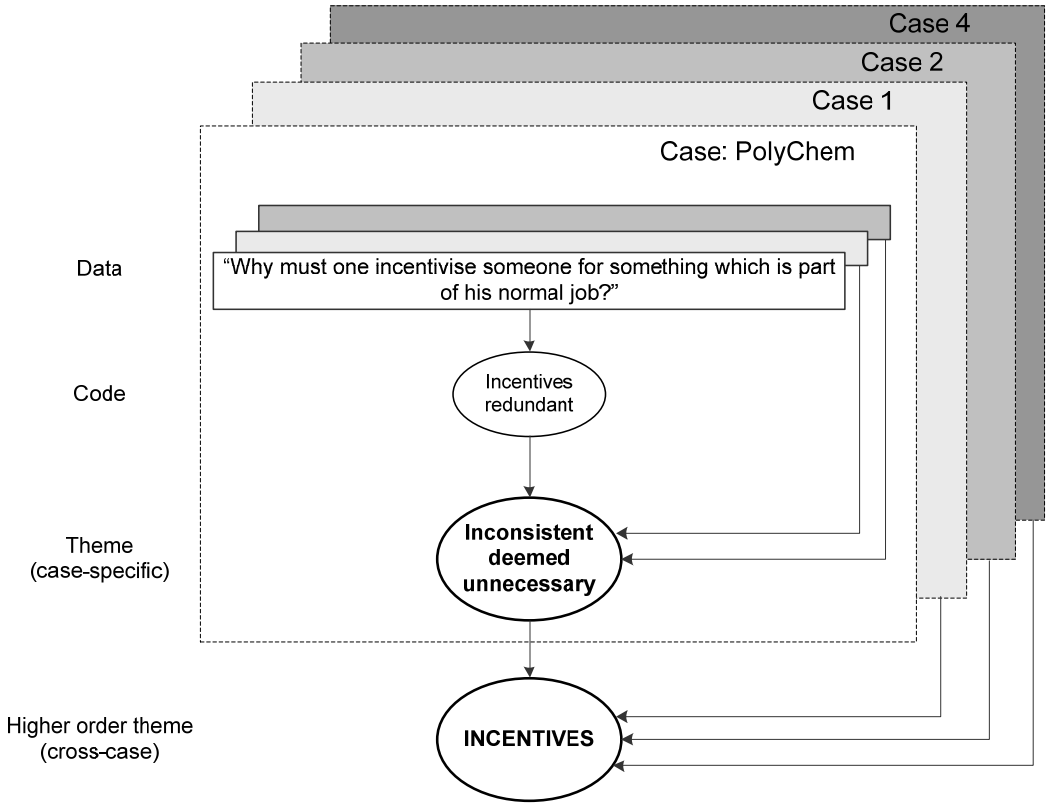


Figure 9.2: Thematic analysis of PolyChem

The mapping of the various themes to the knowledge-centric capability framework is presented in Figure 9.3. The inner and outer tiers respectively represent the three dimensions of the knowledge-centric capability framework and the five sub systems of a viable system, initially presented in Figure 3.5. The comparative main themes are presented in the second tier, while the case-specific themes are presented in the third tier. In analysing the data the emphasis was placed on identifying the factors that influence the knowledge-centric capability of the organisation.

From the thematic analysis, five case-specific themes emerged in the Intent dimension of the knowledge-centric capabilities framework, namely an undefined knowledge management strategy, technology-driven structure, arbitrary learning culture, incentives deemed unnecessary and facilitative technology.

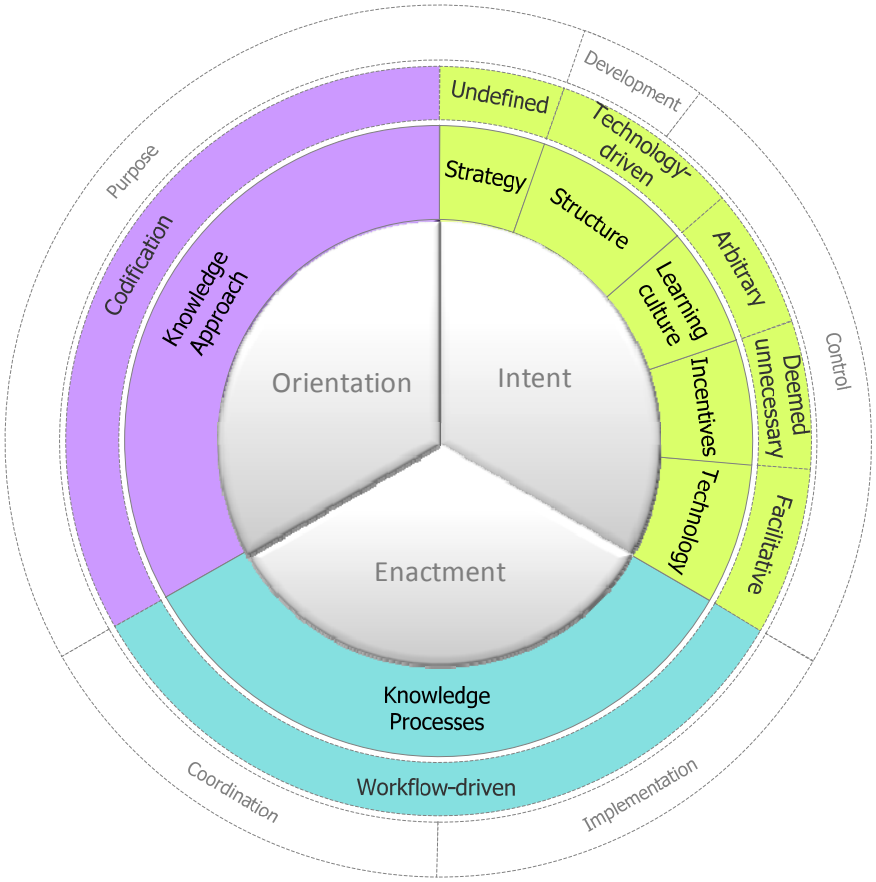


Figure 9.3: Thematic analysis of the Mechanistic capacity of PolyChem

The codification knowledge approach theme emerged in the Orientation dimension and workflow-driven knowledge processes emerged in the Enactment dimension. In order to better understand the emergence of the Mechanistic capacity, the various themes and the interrelationships that emerged between them are discussed next.

9.5 Discussion

9.5.1 Themes and interrelationships

In order to provide a clear presentation of the interrelationships, the thematic analysis presented in Figure 9.3 is unpacked in an organising framework. This affords the opportunity to make sense of the data and case study themes within the dimensions of the knowledge-centric capability framework originally presented in §3.6, which also served as the theoretical base of the case study questions.

Themes are discussed on the hand of a graphical representation of the theme, as outlined in Figure 9.4.

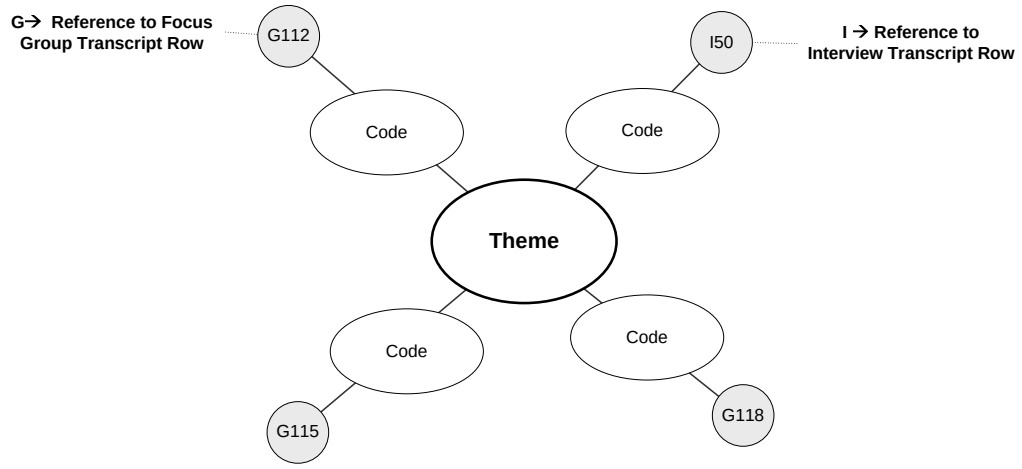


Figure 9.4: Anatomy of the theme representations

The theme is presented in the centre of the diagram, while the codes are presented in the middle-tier. The references to the data are presented in the outer-tier, with a 'G' referring to the focus group transcript and an 'I referring to the interview transcript. The number following the 'G' or 'I' refers to the row in the corresponding transcript. The list of codes is presented in Appendix I and the list of themes is presented in Appendix J. The transcripts are presented in Appendix E.

The interrelationships between the various themes that emerged in PolyChem are illustrated in Figure 9.5.

The mapping to the knowledge-centric capability framework is visible in the green blocks representing the Intent dimension, the purple blocks representing the Orientation dimension and the turquoise blocks representing the Enactment dimension. The mapping to the 'organisation-as-a-viable-system' view is visible in the five sub-systems of the Viable Systems Model, namely Purpose, Development, Operational control, Coordination and Implementation.

The statements from which the respective themes emerged are numbered within each theme block, while the interrelationships are represented by the black and white connectors, numbered 1 through 7.

Each of the themes and their underlying relationships are discussed next.

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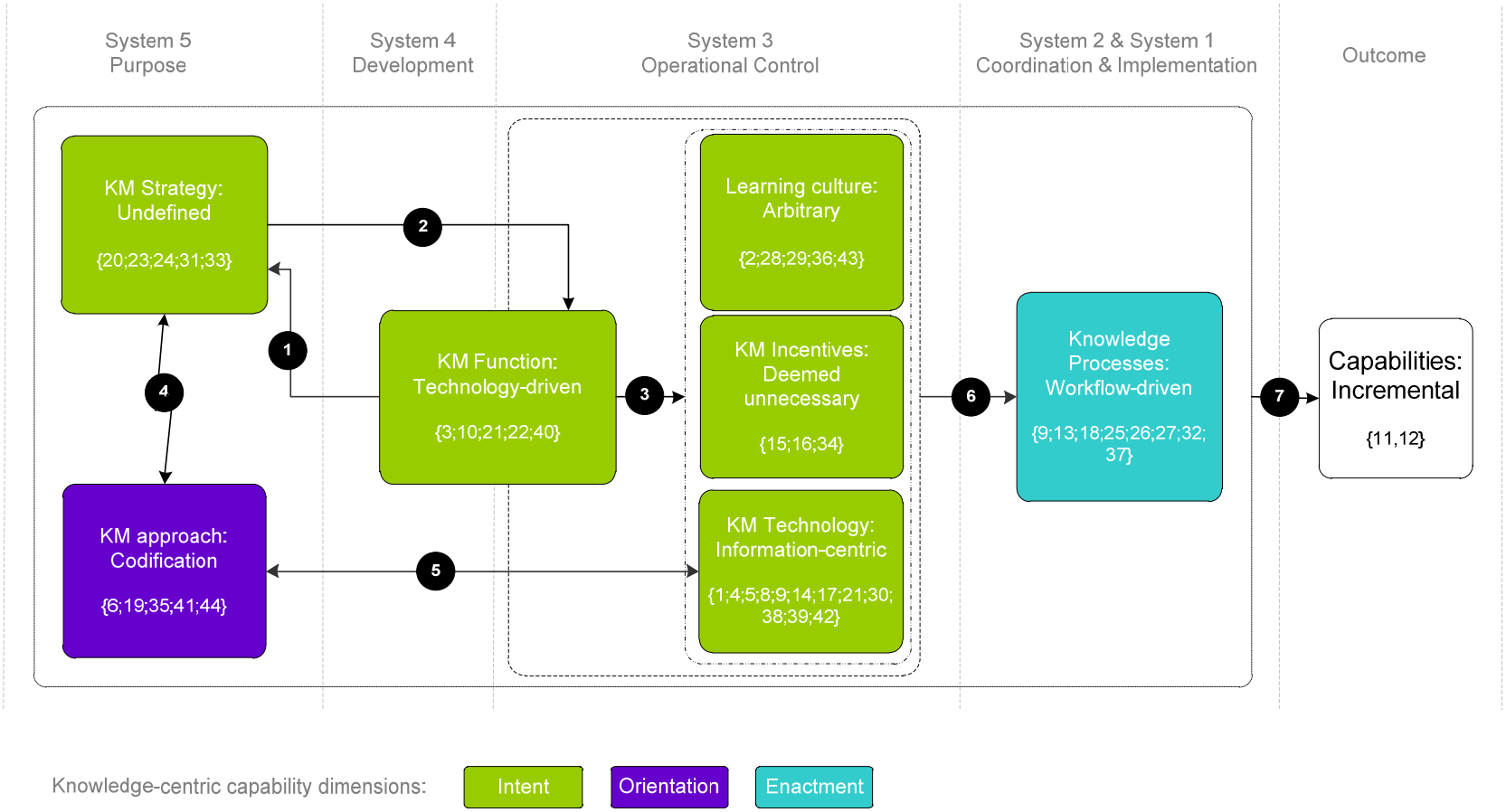

Figure 9.5: Interrelationships between PolyChem's themes

9.5.2 Undefined knowledge management strategy

One of the key success factors of knowledge management initiatives is a formal, clearly articulated knowledge management strategy (Davenport, *et al.*, 1998; Khalifa & Liu, 2003; Skyrme & Amidon, 1997; Wong & Aspinwall, 2005; Zack, 1999a). From a viable systems perspective, as discussed in §3.6.5, a knowledge management strategy forms part of System 5 – Purpose, which is responsible for the direction of knowledge management within the organisation (Beer, 1994; Jackson, 2003). PolyChem however does not have a formal knowledge management strategy and "undefined knowledge management strategy" emerged as a sub-theme from six statements, as illustrated in Figure 9.6.

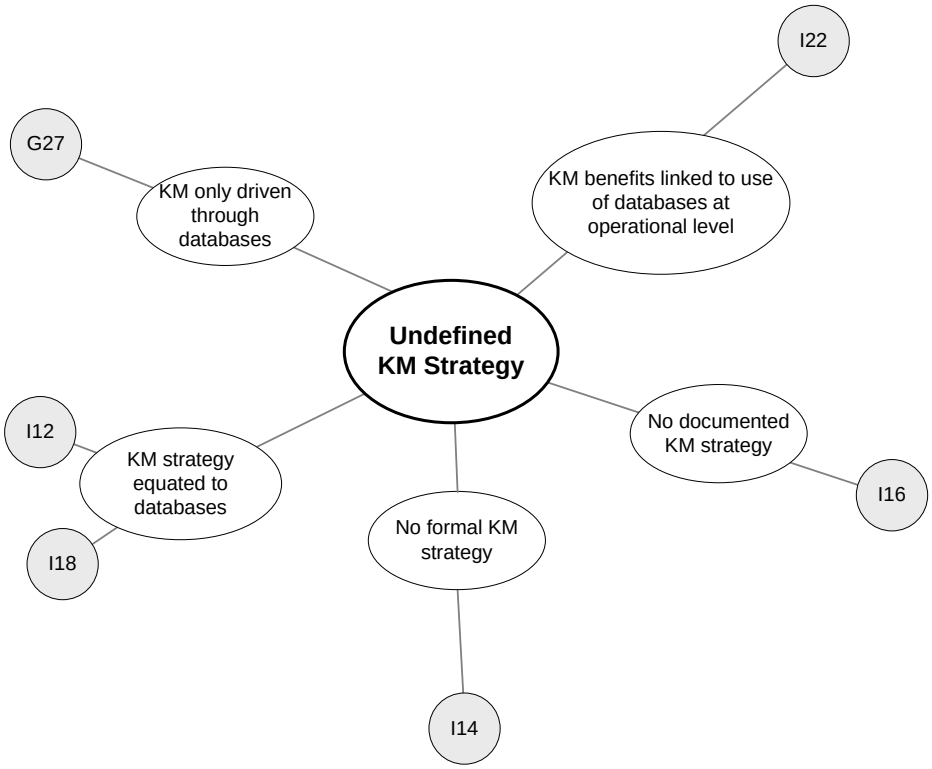

Figure 9.6: Undefined knowledge management strategy

A knowledge management strategy should provide direction and outline how knowledge can be used to allow the organisation to anticipate and adapt to change in the environment. It should not only provide the foundation for developing a common language and momentum for change, but also define key domains of knowledge and knowledge processes (Skyrme & Amidon, 1997). In PolyChem, the company's Lotus Notes databases are equated to a knowledge management strategy. Responding to a question of why the company decided to implement knowledge management, it transpired that the company does not have a formal

knowledge management strategy, but rather that the Lotus Notes databases are in essence viewed as the knowledge management initiative:

> *"It is formally implemented in the sense that there are different databases, […]; but it is not a documented strategy." (Appendix F:I16).*

A closer look however reveals that PolyChem's knowledge management initiative can better be described as a collaborative information management system. PolyChem's Lotus Notes databases are clearly targeted at an operational level, with better decision making highlighted as the main expected benefit. When asked why better decision making is viewed as the main expected benefit from knowledge management, the response was rather theoretical:

> *"…if you only have 10% of the knowledge that's available at your disposal, it will be difficult to make any decisions; where if you have the information available at your fingertips, it's much easier to assess and you don't have to guess in terms of what decision to take, because you'll work from the facts rather than a thumb suck or a wish basically". (Appendix F:G15).*

The theoretical nature of the response emphasises the absence of a formal knowledge management strategy which should outline concrete benefits expected from the knowledge management initiative.

The respondents' emphasis on better decision making further highlights another problem arising from the absence of a formal knowledge management strategy. Company documentation highlights the development of expertise and a focus on customer service excellence as the key driving forces of the business. The goal of the knowledge management initiative, namely better decision making, is thus not aligned with the business strategy. Numerous studies (APQC, 2003; Davenport, 1999; Hansen, *et al.*, 1999; Khalifa & Liu, 2003; Liebowitz, 1999b; Skyrme & Amidon, 1997) have shown that, in order to be successful, a knowledge management strategy must be aligned with the business strategy. A company like Dow Chemicals spent three years integrating its intellectual assets into the business strategic thinking of the corporation, maximising the business value of its intellectual assets and developing a management process to help maximising the creation of new valuable intellectual assets (Petrash, 1996). Through this effort Dow was able to reduce its patent tax maintenance costs by $40 million over the life of the patent portfolio, which in turn acted as a spring board for many other process changes that would follow (Petrash,

1996). This was possible, however, mostly because the company had spent time developing a formal knowledge management strategy that is aligned with its business goals, and developing a vision around the strategy. The vision provided the 'common hook' (Skyrme & Amidon, 1997) around which the momentum for change was built in Dow Chemical Company.

PolyChem's focus on operations and lack of a formally defined knowledge management strategy confirms Nunes, Annansingh and Eaglestone's (2006) observation that small and medium enterprises tend to focus on the short term. With such a short term approach, achieving key strategic goals through the current knowledge management initiative will however prove challenging.

9.5.3 An arbitrary learning culture

The preceding case studies in Chapters 7 and 8 highlighted the important role played by organisational learning in the emergence of dynamic capabilities, as concurred by Eisenhardt and Martin (2000), Teece, Pisano and Shuen (1997) and Zollo and Winter (2002). PolyChem's learning culture can only be described as arbitrary. Apart from occasional formal training activities presented by the parent company and mentorship programmes for lower level technicians, no other formally coordinated learning activities were identified. The arbitrary nature of PolyChem's learning culture emerged from eleven statements, as illustrated in Figure 9.7.

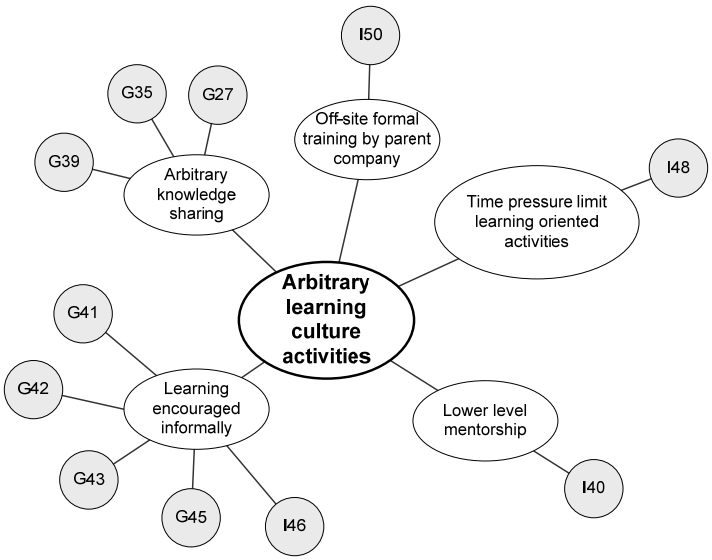

Figure 9.7: Emergence of arbitrary learning culture theme

Developing expertise is considered as one of the driving forces for PolyChem. One would thus expect to find a set of formally coordinated learning activities geared towards achieving that business goal. No formally coordinated learning activities based on interaction between employees were however identified. This finding is supported by previous studies (O'Regan, Ghobadian, & Gallear, 2006; Terziovski, 2010) that found that SMEs do not use an innovation or learning culture in a structured or strategic manner.

From the interviews one almost gets the impression that accessing the databases is preferred to interacting with fellow employees, which could be a barrier to establishing a learning culture:

> *"By accessing certain databases I can familiarise myself with the clientele, with the competitors, the type of products the competitors are selling […]; so in that sense the technology structure that we have in place can actually pass on that knowledge without the interaction with our staff". (Appendix F:G27).*

As discussed in §2.2.5, knowledge is both personal and social, meaning knowledge creation and sharing is dependent on personal interaction. In order to establish a learning culture, connecting people to each other and helping them to develop knowledge in a semi-structured way, is just as important as connecting people to databases (Skyrme & Amidon, 1997). PolyChem therefore needs to consider what formal activities and structures can be put in place to encourage active knowledge sharing.

Previous studies (Desouza & Awazu, 2006; Robinson, 1982) have also found that SMEs are particularly skilled at exploiting external sources of knowledge. This also seems to be the case here:

> *"So every bit of knowledge that we gain from our technology partners, we then apply back into our processes, and as G says, when our guys go out there, generally we go and look at processes that are similar to ours, and new developments on those processes that we could possibly do in-house, to further improve our processes and in that way obviously become a bit more competitive and a bit more profitable" (Appendix F:G74).*

PolyChem has technology licensing agreements with Dow Southern Africa, E I du Pont de Nemours & Co., Kraton Polymers, Milliken Chemical, Victrex plc. and RTP Company. The nature of these licensing agreements can be categorised as exploitation alliances, as described in the literature (Benner & Tushman, 2003; Hoang & Rothaermel, 2010; Teece, 1992).

Through these agreements employees in the technical areas do get access to external knowledge, which, if harnessed correctly, will give PolyChem an excellent opportunity to further develop its internal expertise. Formally coordinated learning processes are however required to ensure that the knowledge is assimilated into the organisation, thereby building a learning culture within PolyChem. The external exploitation processes need to be augmented with internal exploration experiences in order to develop firm-specific knowledge that will enable PolyChem to monitor, filter, evaluate and leverage externally generated knowledge (Helfat, 1997; Hoang & Rothaermel, 2010).

To ensure that there isn't an over emphasis on efficiency and controls at the cost of learning, a company like 3M put organisational structures such as fairs and technical audits of labs by other 3M teams in place (Brand, 1998). With fairs 3M employees are invited to examine ideas on a confidential basis to evaluate its potential for application in the markets in which 3M operate. Technical audits are furthermore conducted by teams of another lab, which can result in the generation of new ideas. Seeing that PolyChem's laboratory is subject to technical audits from its technology licensors, they could perhaps emulate these initiatives and negotiate an opportunity for their technical team to participate in technical audits of the licensors' laboratories. The literature supports the notion that manufacturing SMEs are likely to improve their performance as they increasingly mirror large manufacturing firms with respect to strategy and formal structure (Terziovski, 2010).

Further evidence of the arbitrary nature of PolyChem's learning culture emerged from the response to the question of whether employees share knowledge freely:

> *"It depends on who you deal with. Like he said, some people will just generally give it all and feel that it would better the working environment, while other people will just generally not share it, because they feel threatened teaching somebody else". (Appendix F:G39).*

The willingness to share knowledge between individuals is directly affected by the culture within the company (Brand, 1998). Furthermore, PolyChem is in the midst of a retrenchment process, and companies with a history of downsizing face a particular problem in the domain of knowledge sharing, with employees fearing that their value to the company might decline if they share their knowledge freely (De Long & Fahey, 2000). The unwillingness of some PolyChem employees to share knowledge thus highlights the absence of a formally encouraged learning culture and associated incentives, which introduces the next theme.

9.5.4 Knowledge management incentives deemed unnecessary

Numerous studies (Argote, *et al.*, 2003; Brand, 1998; Davenport & Prusak, 1998; Liebowitz, 1999b; Lucas & Ogilvie, 2006; Russell, 1996; Skyrme & Amidon, 1997) discuss the importance of rewards and incentives in the knowledge management process, as well as their alignment with an organisation's knowledge management objectives. The incentives deemed unnecessary sub-theme in PolyChem emerged from 3 statements, as illustrated in Figure 9.8.

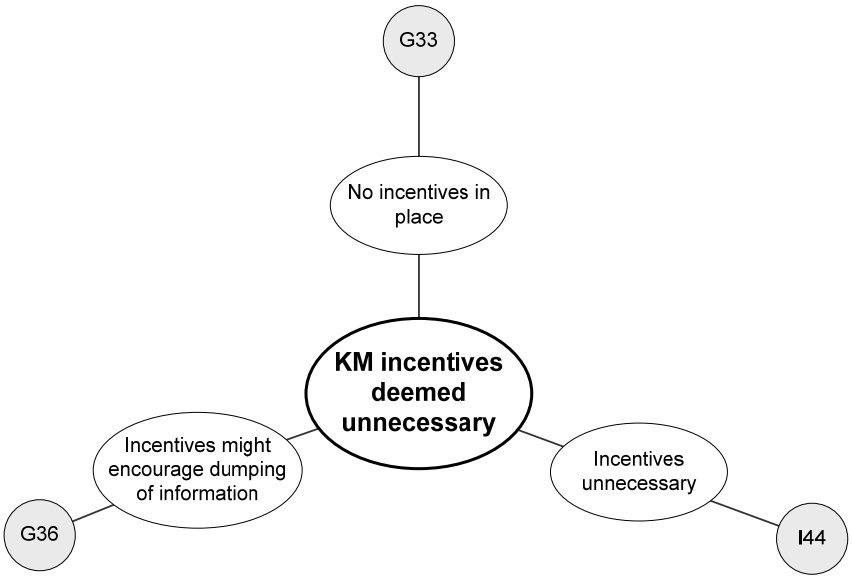

Figure 9.8: KM incentives deemed unnecessary subtheme

The Systems and Training manager views incentives for knowledge sharing as unnecessary, as he feels knowledge sharing forms part of people's day to day jobs in any case:

> *"No, we don't look at it, because for me it basically means that if a person is not going to use the knowledge base, he'll be shooting himself in the foot. Why should one incentivise a person to do something that is part of his job?" (Appendix F:I44).*

This sentiment highlights that PolyChem's knowledge management initiative is not focussed on knowledge sharing as such, but rather on what Russell (1996) termed information reporting. Where information sharing is informal, ad hoc, unstructured, voluntary and non-systematic, information reporting is formal, periodic, structured, mandatory and systematic (Russell, 1996). The description of information reporting fits PolyChem's capturing of information in the Lotus Notes databases perfectly. Employees are expected (mandatory) to capture certain fields of information (structured) after completing a task (periodically) in the appropriate Lotus Notes database (formal and systematic). When the focus is information

reporting rather than knowledge sharing, one can understand the view that incentives are not deemed necessary. This again highlights the problems resulting from the lack of a formal knowledge management strategy and the uncertainty regarding the company's intent with knowledge management.

A further consequence of the lack of a formal knowledge management strategy is that employees do not know which knowledge or information is deemed as important to the knowledge management initiative, as is evident from another participant's fear regarding incentives for knowledge sharing:

> *"Others will purely look at it as a 9-to-5 job. I come in; I go home; I get paid and that's all I want out of it. So if you incentivise it, you're running the risk of everybody just dumping a whole lot of [nonsense] in there". (Appendix F:G36).*

A formal knowledge management strategy should provide guidelines about what knowledge is deemed important, and how knowledge sharing will be rewarded or what sanctions will be applied for non-sharing of information or abuse of the system by dumping irrelevant information. The CEO of Buckman Labs, a chemicals company recognised as one of the most successful in implementing a knowledge sharing network, outright told employees: "Those of you who have something intelligent to say now have a forum in which to say it. Those of you who will not contribute also will become obvious. If you are not willing to contribute or participate, then you should understand that the many opportunities offered to you in the past will no longer be available" (Rifkin, 1996: 4).

Some of the focus group participants did however feel that incentives in one form or another were necessary:

> *"I think there are mechanisms that could be put in place. They say knowledge is power. The difficulty is how do you encourage people?" (Appendix F:G33).*

In the literature it is recommended to create the conditions for sharing knowledge where sharing result in personal benefit to both parties (Roth, 2003).

9.5.5 Information-centric technology paradigm

A well-developed technical infrastructure can support and enhance organisational knowledge management and its underlying processes (Alavi & Leidner, 2001; Alavi & Tiwana, 2003; Davenport, *et al.*, 1998; Liebowitz, 1999b; Skyrme & Amidon, 1997; Zack, 1999b).

Information-centric technology paradigm emerged as a sub-theme from thirteen statements, as illustrated in Figure 9.9.

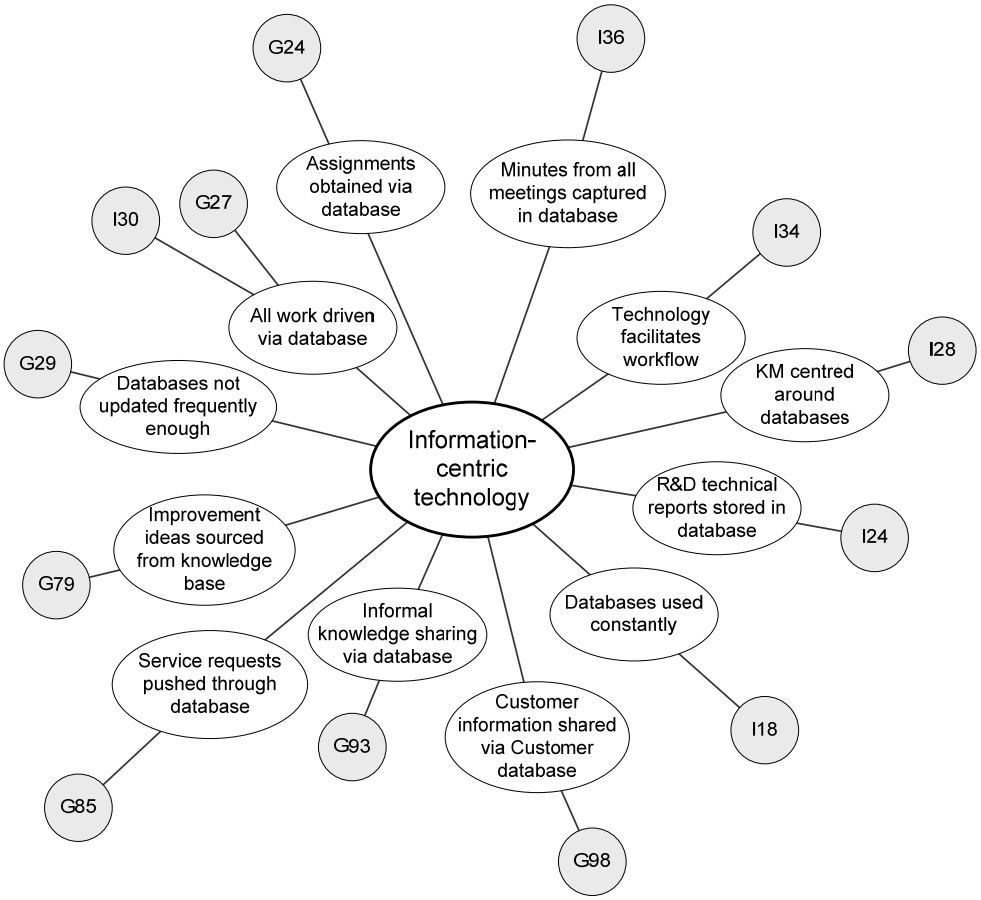

Figure 9.9: Emergence of information-centric technology subtheme

As discussed in §9.5.5, PolyChem's technology infrastructure is more information-centric than knowledge-centric. The technology infrastructure is not used for typical knowledge management applications, such as expert location, social networking or collaborative knowledge creation through wiki's or similar technologies. The technology infrastructure is rather used as a workflow system, prompting employees to capture information as part of their daily activities, i.e. information reporting. Furthermore, a feeling exists that some of the knowledge databases are not updated frequently enough:

> *"I think our databases can be updated more frequently. There are certain databases that I feel – again, it depends on who you speak to – from my perspective there are certain databases that have fallen by the way side. I find that our competitor databases are out of date." (Appendix F:G36).*

Information about competitors offers an enormous opportunity to develop insight into the external environment. If the databases are not kept up to date, it means PolyChem will have an out-dated outlook about its external environment.

Although collaborative technology such as Lotus Notes has proved a valuable enabler in providing communications and interaction mechanisms for effective cooperation, pro-active management is needed to transform it from an information infrastructure into a knowledge infrastructure (Skyrme & Amidon, 1997). This leads to the next theme that emerged, namely a technology-driven knowledge management function.

9.5.6 Technology-driven knowledge management function

As part of knowledge management leadership, a formal knowledge management function is often considered a key success factor for knowledge management initiatives (Davenport, *et al.*, 1998; Holsapple & Joshi, 2000; Liebowitz, 1999b; Ribière & Sitar, 2003; Skyrme & Amidon, 1997). In PolyChem the largely technology-driven knowledge management structure emerged as a sub-theme from five statements, as illustrated in Figure 9.10.

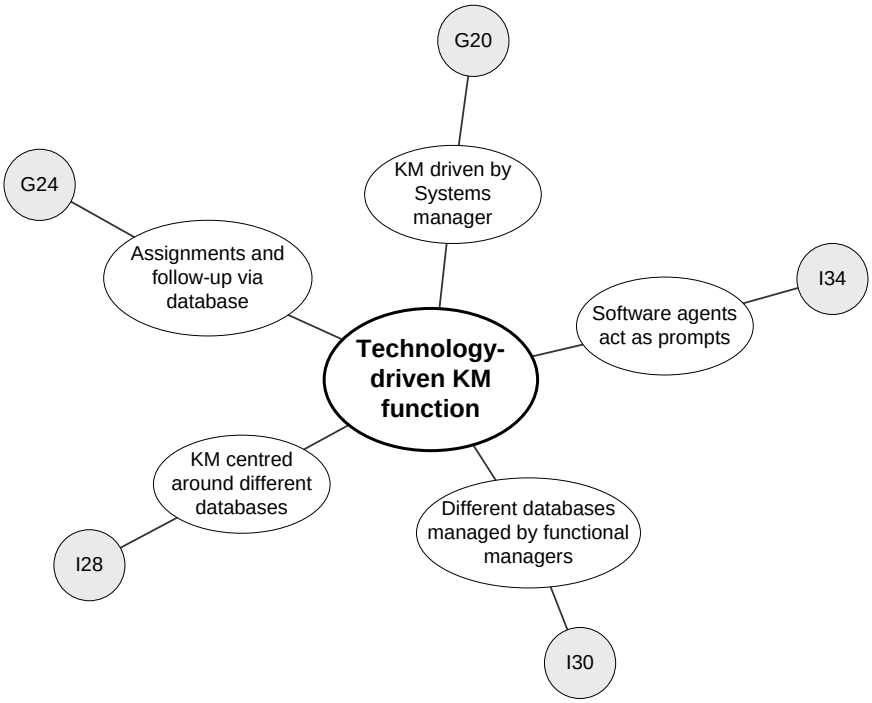

Figure 9.10: Technology-driven KM structure sub-theme

The Systems and Training manager has sole responsibility for knowledge management in PolyChem. No formal structures, other than the Lotus Notes databases, are in place to support and encourage knowledge management in the company.

Skyrme and Amidon (1997) warn that although tools such as Lotus Notes can enable a powerful information network, pro-active management is needed to transform it from an information infrastructure into a knowledge infrastructure.

The lack of formal leadership in a structured knowledge management function holds significant implications for the knowledge-centric capability of PolyChem, as is evident from the interrelationships between knowledge management strategy, development and operational control of knowledge management. These interrelationships are presented in Figure 9.11 by connector (1), connector (2) and connector (3).

In §2.3 the organisation was explored as an open, goal-seeking system, with the ability to align itself with its external environment identified as a requirement for an organisation to remain viable. This alignment can be achieved through organisational learning (Daft & Weick, 1984; Fiol & Lyles, 1985) which involves scanning the environment and providing information to managers, giving meaning to the information through interpretations and learning which means taking action based on the interpretation.

The first interrelationship, represented by connector 1 in Figure 9.11, emerged between the undefined knowledge management strategy and technology-driven knowledge management function, respectively mapped to the Purpose and Development sub-systems of a viable system, as discussed in §2.3.3. Connector 1 represents the impact of a technology-driven knowledge management function, in other words, a weak System 4 (development). As discussed in §2.3.3, System 4 typically has to provide a structure for bringing together knowledge about the external and internal environment which should form the basis for decision making and strategy formulation (Beer, 1972; Jackson, 2003). In the knowledge-centric view, one of the functions of System 4 is to switch instructions regarding the knowledge management strategy from System 5 to the lower-level systems, and to switch upward, from Systems 1 and 3, information required by System 5 to make strategic decisions, filtering-out insignificant information and aggregating important information before passing it on to System 5 (Jackson, 2003). Although PolyChem's databases can serve as the structure where all this information is captured, human interpretation is still necessary to perform the filtering and aggregation functions. PolyChem's current knowledge management structure does not allow for this, with the Training and Systems manager the only person with a formal knowledge management responsibility.

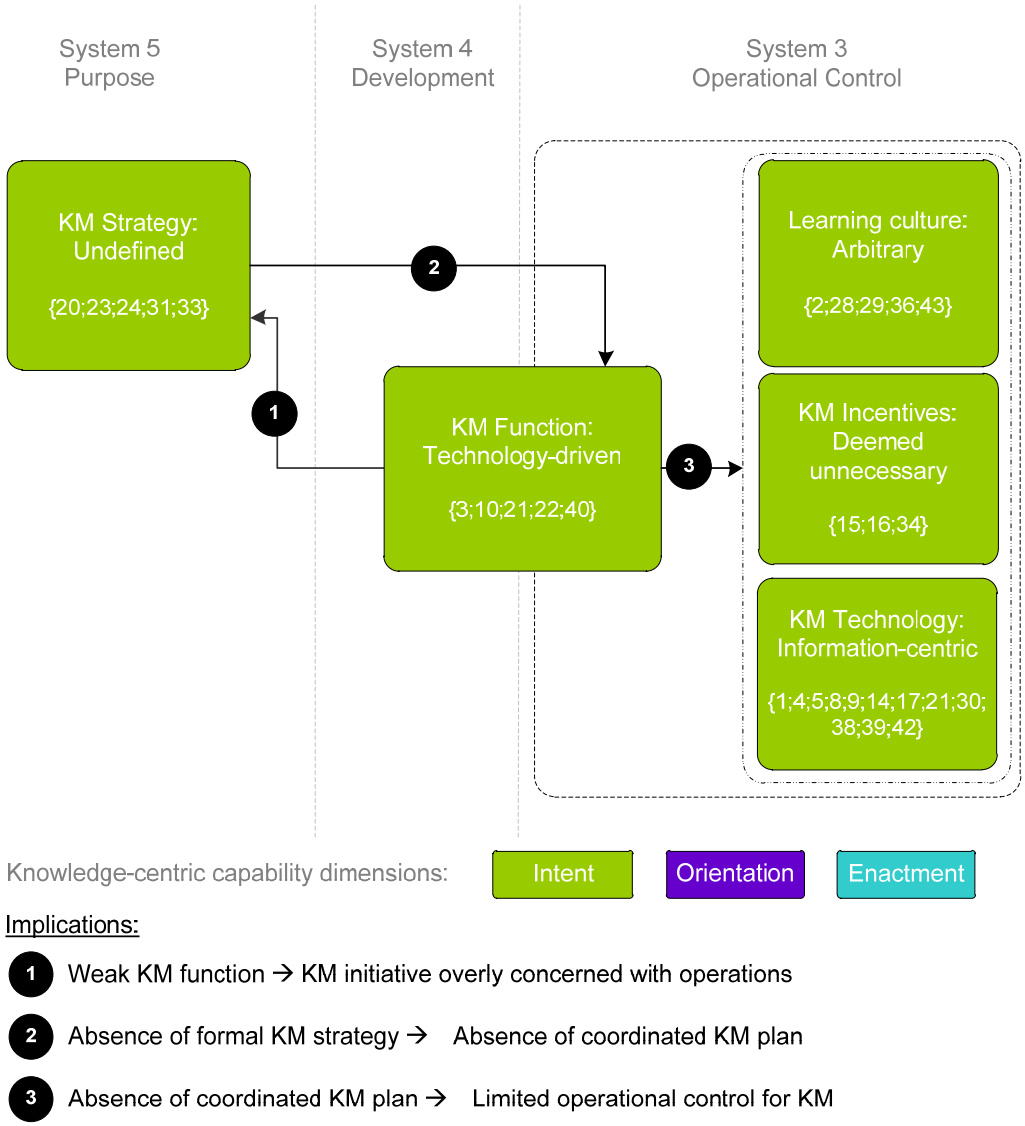

Figure 9.11: Emerging interrelationships between purpose, development and control

Another important function of System 4 is to capture for the organisation all relevant information about its total environment, i.e. its internal and external environment. In other words, System 4 is responsible to provide the organisation with a model of its total environment, enabling predictions about the likely future state of the environment and allowing timely responses. In PolyChem this function is not formally coordinated, which could risk the long-term viability of the organisation.

The literature (Beer, 1984; Jackson, 2000, 2003) also highlights that if System 4 is weak, System 5 typically collapses into System 3, becoming overly concerned with day-to-day activities. This is quite evident in PolyChem where the lack of a formal knowledge

management strategy has resulted in the knowledge management initiative only being focused on information reporting at an operations level.

The second interrelationship (connector 2), represents the absence of a coordinated knowledge management plan and emerged between the undefined knowledge management strategy and the part of the knowledge management function responsible for operational control. As discussed in §2.3.3 the control function in a viable system is not responsible for initiating the knowledge management strategy, but rather to interpret it and to pass a coordinated plan on to the business units for implementation (Beer, 1994; Jackson, 2003). In §9.5.2 however we saw that PolyChem doesn't have a formal knowledge management strategy. This probably then is the cause for the misalignment between the business goals of developing expertise and customer focus, and the knowledge management goal of improving decision making.

The third interrelationship, limited operational control for knowledge management, is represented by connector 3. It emerged between the technology-driven knowledge management function and three components of operational control, namely learning culture, incentives and technology. The discussion in §2.3.3 showed that, in a viable system, the operational control (System 3) is responsible for interpreting the strategy and communicating it as a coordinated plan to business units for implementation (Beer, 1994; Jackson, 2003). In PolyChem no formal knowledge management strategy has been defined, leaving the knowledge management function with no basis from which to start its interpretation, resulting in the absence of a formally coordinated knowledge management plan.

This is particularly evident in the three components of operational control. First the arbitrary nature of PolyChem's learning culture shows that few formally coordinated learning processes, aimed at establishing a learning culture, are in place. Organisational learning is an essential ingredient of an organisation's dynamic capabilities (Eisenhardt & Martin, 2000; Teece, *et al.*, 1997; Zollo & Winter, 2002), and without a learning culture PolyChem employees will remain reluctant to share their knowledge. A formal knowledge management plan thus needs to outline structures that need to be put into place to foster a learning culture within the company.

Second, incentives for knowledge management are deemed unnecessary, highlighting a deeper problem with PolyChem's knowledge management initiative. The repositories are used for information reporting, and it is understandable that one doesn't want to incentivise

employees for reporting mandatory information. A formal knowledge management plan needs to outline what knowledge is deemed important to the company and how creating or sharing that knowledge will be rewarded, or how non-participation will be sanctioned. Rewards don't have to be of a monetary nature, but can include recognition programmes.

Finally, the information-centric nature of the technology, discussed in §9.5.5, further supports the finding that the lack of a formal knowledge management plan is hampering PolyChem's ability to leverage knowledge as a strategic asset. Although the business goal is to develop expertise and a customer focus, the technology is geared towards reporting information and improving decision-making. PolyChem needs to investigate ways in which the current technology infrastructure can be aligned with the business goals.

9.5.7 Codification approach to knowledge management

PolyChem's knowledge management approach exclusively comprises a codification approach. The 'Codification' subtheme emerged from eleven statements, as illustrated in Figure 9.12.

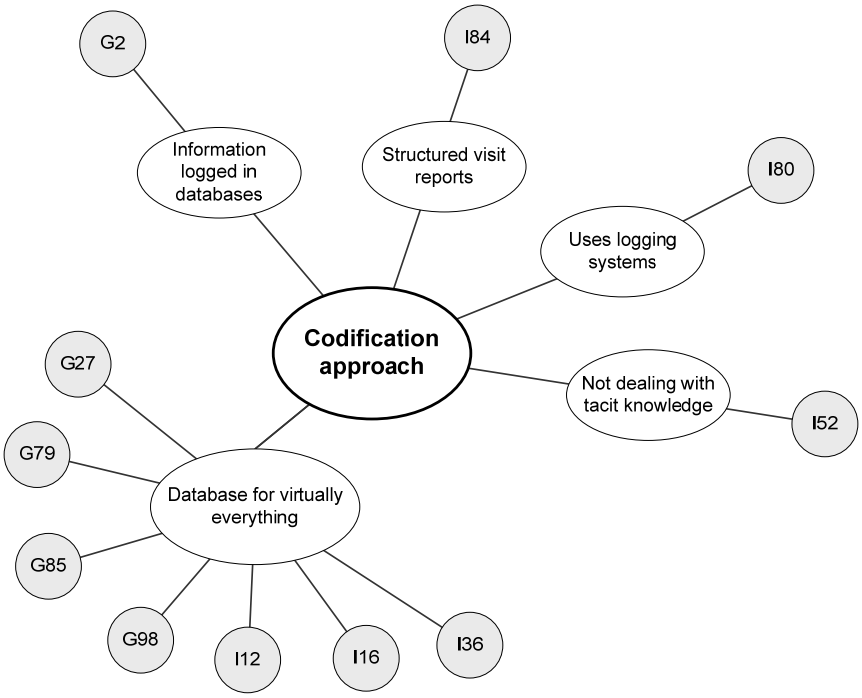

Figure 9.12: Emergence of codification approach subtheme

In fact, when asked how important tacit knowledge such as skills, experience and know-how which cannot be codified was to PolyChem, the Systems and Training manager responded:

"Currently we don't have a database for that". (Appendix F:I52).

This response again highlights the information reporting mind set dominant in PolyChem, and perhaps suggests a lack of understanding of the differences between explicit and tacit knowledge and the role that each plays within the company.

The effect of a company's over-reliance on capturing explicit knowledge is considered to be detrimental to the natural desire to learn exhibited by most people (O'Dell, *et al.*, 1998). Furthermore, the personal, social and context specific nature of knowledge means that tacit knowledge cannot be converted into explicit knowledge without losing some important meaning (Cook & Brown, 1999; Polanyi, 1958; Tsoukas, 2003), as discussed earlier in §2.2.5 and §2.2.6. Although certain types of knowledge can be codified, explicit and tacit knowledge fulfil different epistemological roles. In fact, most of the important knowledge a person needs to implement a practice cannot be codified, but should be demonstrated to them, or it requires interaction between people (O'Dell, *et al.*, 1998).

PolyChem's main goal with knowledge management is to improve decision-making. However Haas and Hansen (2007) explain that the main benefit derived from codified knowledge is saving time, and that quality and competence is not improved in the process. PolyChem's codification approach is therefore not aligned with the goal of improving decision-making. A study by The Economist Intelligence Unit (2007) further shows that the majority of manufacturing concerns, which included the chemicals industry, consider the sharing of best practice around business processes(>60%), and the ability to respond more effectively to customer demands (>50%) as the main benefits of improved knowledge flow within their companies. These benefits would be more aligned with PolyChem's stated business goals of developing expertise and customer focus. Better decision making, which is more focused at an operational level, was only considered as a benefit by 25% of the respondents.

The codification approach results in interrelationships between strategy, approach and technology, as presented by connector 4 and 5 respectively in Figure 9.13. The misalignment between PolyChem's codification approach and knowledge management goal of better decision making is represented by connector 4.

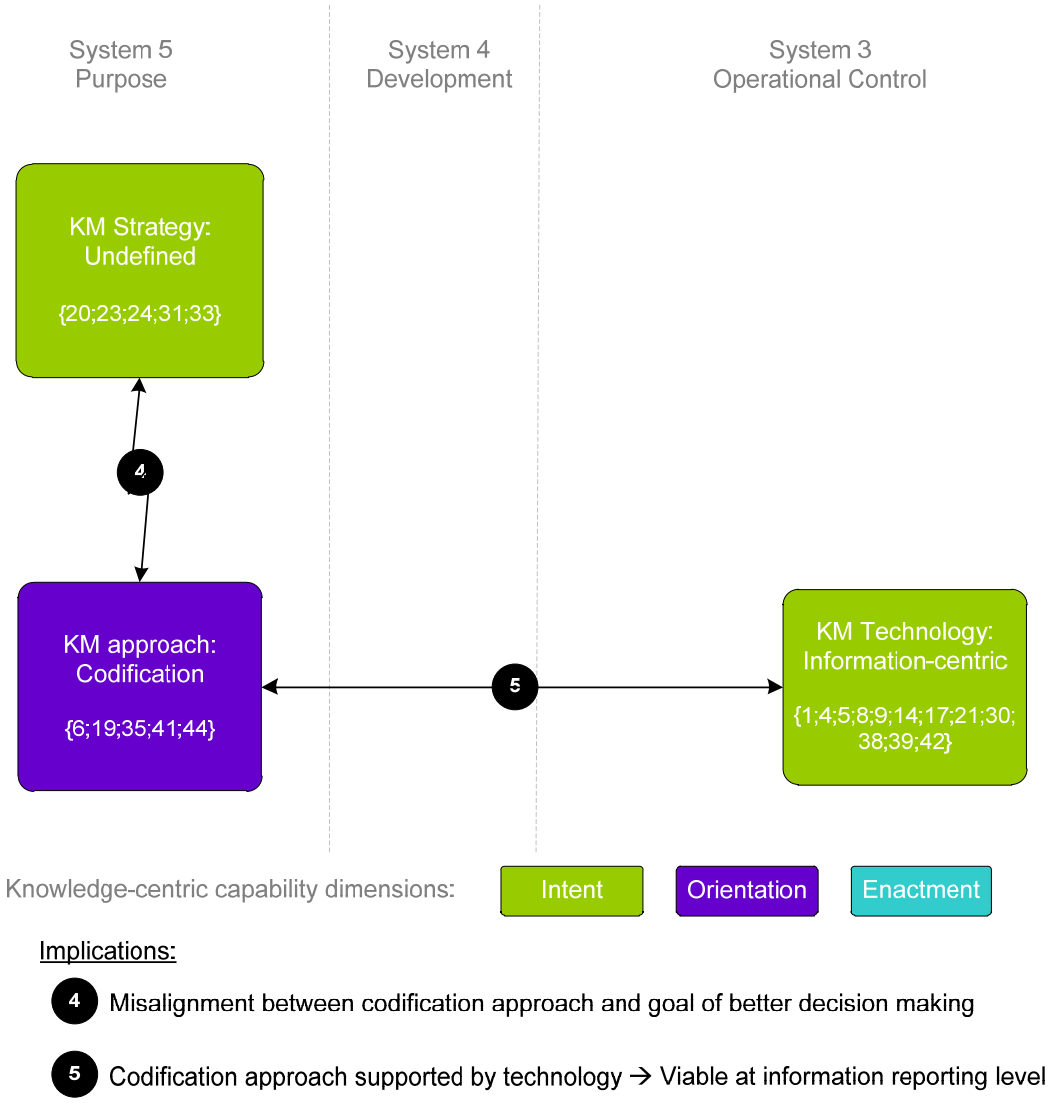

Figure 9.13: Interrelationships between strategy, approach and operations

PolyChem's codification approach to knowledge management is supported by technology, although the technology is more geared towards information reporting (connector 5). The technology thus will support the codification approach as long as the goal is the reporting of information to enable better decision making. Without changes to the current approach to knowledge management and the technology infrastructure, the business goal of developing expertise will not be supported. A personalisation approach to knowledge management, i.e. developing networks for linking people in order to share tacit knowledge (Hansen, *et al.*, 1999), is better suited to the personal, social and context-specific view of knowledge as discussed in §§2.2.5-2.2.6.

Changing the approach to knowledge management will however require a change in the dominant logic regarding knowledge management in the company. Dominant logic is defined as 'the way in which managers conceptualise the business and make critical resource allocations decisions …' (Prahalad & Bettis, 1986: 490). In the context of knowledge management dominant logic can thus be described as the way in which managers conceptualise knowledge and make resource allocations according to that conceptualisation. To change the dominant logic and behaviour will require a degree of unlearning in PolyChem regarding knowledge and knowledge management as a practice. Unlearning is the process by which organisations eliminate old logic and behaviours and make room for new ones (Prahalad & Bettis, 1986: 498). In §2.3 the organisation was explored as an open, goal-seeking system, with the ability to adapt to changes in its external environment identified as a requirement for an organisation to remain viable. In PolyChem's instance adapting includes unlearning the old dominant logic about the nature of knowledge and what knowledge management entails. Bettis and Prahalad (1995) though warns that organisations which anticipate a fairly stable environment, i.e. complex systems near equilibrium, tend to perform in a repetitive manner, almost acting as if it is blind. The nature of change in dominant logic regarding knowledge management that PolyChem needs to make is apparent in the Training and Systems manager's comment that they haven't yet implemented a database to capture tacit knowledge, even after being explained that tacit knowledge cannot be captured (Appendix E.52). It is almost as if PolyChem is transfixed on capturing everything in a database.

9.5.8 Workflow-driven knowledge processes

PolyChem's knowledge processes are workflow-driven, with intelligent software agents in Lotus Notes databases prompting employees to capture certain information when performing certain activities. PolyChem's workflow-driven knowledge processes sub-theme emerged from nine statements, as illustrated in Figure 9.14.

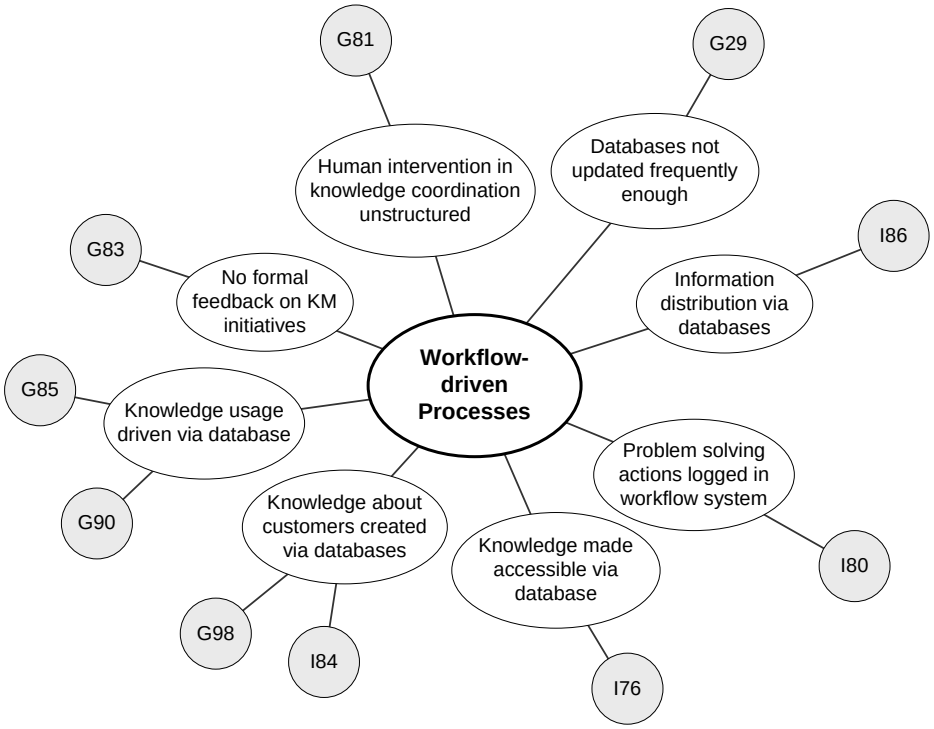

Figure 9.14: Emergence of workflow-driven knowledge processes subtheme

The more dependent individual members of an organisation are on one another, the greater the need for effective group coordination (Foss & Mahnke, 2005; Pfeffer, 1997; Pfeffer & Salancik, 1978; Van de Ven, *et al.*, 1976).

In PolyChem's workflow-driven environment, employees are greatly dependent on one another with workflow being indicated as reciprocal:

> *"Back-and-forth. Absolutely. It's the ERP system. In fact, I'm currently busy drawing a matrix for the new system to indicate whose output becomes whose input" (Appendix F:I70).*

PolyChem has developed 13 integrated processes which can be categorised as either management-oriented processes, customer-oriented processes or service-oriented processes. Being a manufacturing concern, PolyChem experiences lower levels of task uncertainty and task variability, but employees are still greatly dependent on one another, increasing the need for effectiveness of impersonal coordination mechanisms such as rules, procedures, plans and schedules (March & Simon, 1958; Van de Ven, *et al.*, 1976). Effective coordination will therefore be a key factor in PolyChem's ability to grow and survive.

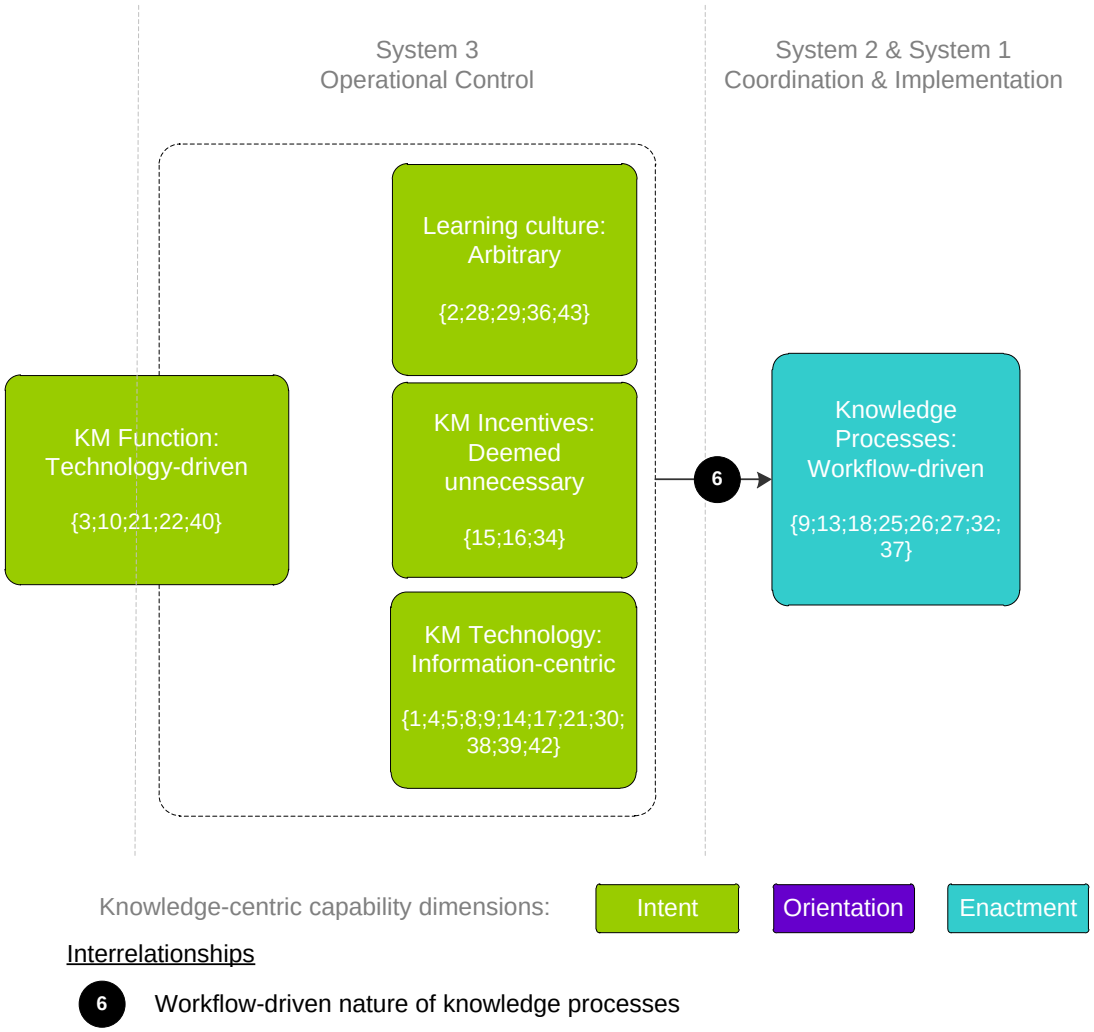

Figure 9.15: Interrelationship between operational control and knowledge processes

PolyChem's knowledge creation processes are largely unstructured, except the processes for acquiring knowledge about customers and competitors, which are more formal:

> *"What we do is what we call visit reports. Each visit report is structured. The guy must say why he visited the customer, which competitors are operating in the same area, how much they're selling, who the sales person is, what the price is; so basically you have a whole database and if I look in the database I know exactly who the competitors are, what they're selling and where they are selling" (Appendix F:I84).*

Knowledge use activities are also largely unstructured, except for using knowledge in the development of new products and using knowledge to solve problems, which are more formal processes. Once a sales person has logged information about a potential product in the

technical development request database, the Marketing and Service Director is notified via the workflow system who will then initiate a project if deemed feasible.

As discussed in §3.6.5, System 2 (operational control) is responsible for communicating a coordinated knowledge management plan to System 1 for implementation (Beer, 1994; Jackson, 2003). The examples of knowledge creation and knowledge usage discussed above illustrate how the workflow-driven knowledge processes in PolyChem function as a coordination mechanism for knowledge management. The mechanistic orientation of the operational control has however resulted in a rather mechanistic approach to knowledge management processes. Davenport (1994) warns that such a mechanistic approach often specify the minutiae of machinery while ignoring how people in organisations actually go about acquiring, sharing and making use of knowledge. "They glorify information technology, and ignore human psychology" (Davenport, 1994: 119).

9.5.9 Incremental capabilities

The dynamic knowledge-based perspective, discussed in §3.4.1 claims that a sustainable competitive advantage can only be achieved through dynamic capabilities, i.e. if an organisation develops the ability to modify and renew its knowledge base by creating, integrating, recombining and releasing its knowledge resources in order to adapt to current changes or to effect change in its environment (Eisenhardt & Martin, 2000).

PolyChem's incremental capabilities subtheme emerged from four statements, as illustrated in Figure 9.16.

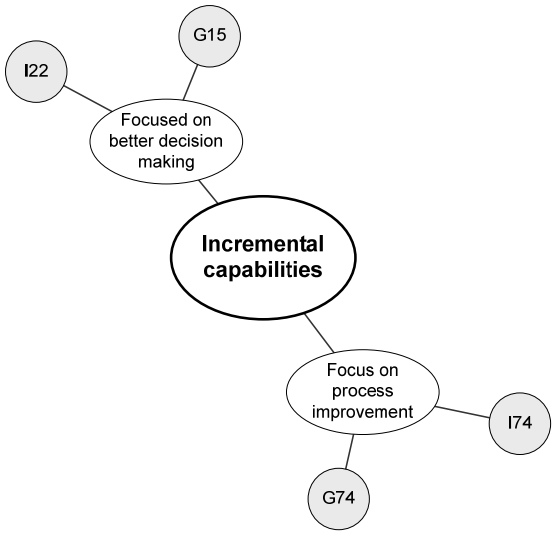

Figure 9.16: Emergence of incremental capabilities subtheme

In an essentially stable environment such as PolyChem's manufacturing environment, there still exists a requirement to adapt the resource base of the firm. The literature (Ambrosini, *et al.*, 2009; Eisenhardt & Martin, 2000) argues that the resource base however, will not be transformed through change, but rather be incrementally adjusted and adapted.

This view proves to be valid in the case of PolyChem, as explained by the Training and Systems manager:

> *"Process improvement in terms of process management –absolutely. The first thing you'll notice in our brochure is continuous improvement. We call ourselves a custom compounding company, so we absolutely have to improve all of the time" (Appendix F:I74).*

This view is echoed by employees in the company:

> *"We're a manufacturing concern, so obviously our focus will always be on processes, unlike a trader" (Appendix F:G74).*

To better understand the nature of PolyChem's competitive abilities, it is necessary to recall Hogarth *et al.*'s (1991) four stage framework discussed in §3.4.1. The first stage of the framework, privileged access, refers to the fact that an organisation has privileged access to resources or product markets. This is the case for PolyChem, where through their technology licenses they have exclusive access to the resources supplied by their technology partners. Privileged access can be a source of competitive advantage for PolyChem, although it may not prove sustainable in the longer term (Hogarth, *et al.*, 1991).

Some of PolyChem's processes, for example the quality processes and health, safety and environment processes conform to industry standards such as ISO9001:2000, ISO TS16949:2000 and the Chemical and Allied Industries' Association Responsible Care Commitment. These processes and standards are in other words not unique to PolyChem and fall within the stage 2 (transformation) category of the framework.

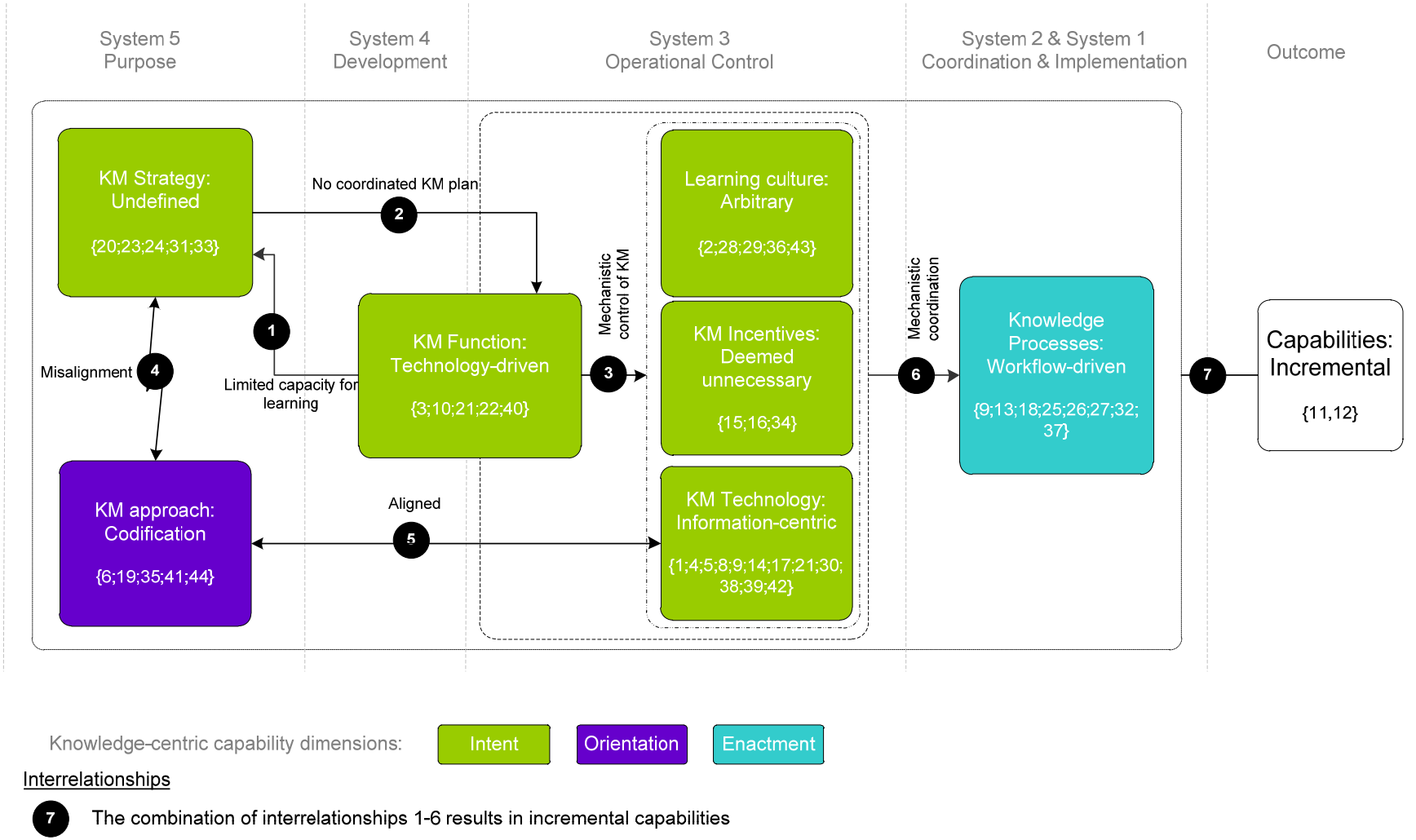

Figure 9.17: Emergence of PolyChem's incremental capabilities

PolyChem's focus on continuous process improvement places those processes in the stage 3 (leverage) category of Hogarth *et al.*'s (1991) framework. Stage 3 activities involve changes to established processes and could, for example, result in better quality products, lower production costs, product line innovation, improvement in management practices, or perhaps the use of better materials or information. The key is to continually adapt processes so that it cannot be easily imitated (Hogarth, *et al.*, 1991). Stage 3 activities are similar to incremental capabilities discussed in the literature (Ambrosini, *et al.*, 2009). PolyChem's capability thus can be described as an incremental capability.

If PolyChem were to put a more formal structure in place to support its knowledge management initiative, in order to scan the external environment in a more proactive manner, and develop a formal knowledge management strategy aimed at exploring opportunities in order to reconceptualise the way their products are manufactured, their activities could be classified as stage 4 (regenerative) activities - in other words dynamic capabilities.

9.6 Conclusion

The purpose of this chapter was to explain why the Mechanistic capacity emerged in a specific organisational context. The PolyChem case study has shown that a number of interrelationships, summarised in Figure 9.17, play a significant role in the emergence of a Mechanistic capacity within PolyChem's organisational context.

PolyChem's intent to create a knowledge-centric environment, represented in green, is not formally defined and lacks the structure required to provide information about the total environment. The lack of context for interpreting the environment limits PolyChem's capacity for learning as well as its capacity to formalise a knowledge management strategy that will enable the company to align itself to or even pre-empt changes in the environment. PolyChem's knowledge management initiative is further hampered by the lack of a function that can produce an actionable plan, resulting in the direction-giving function becoming overly concerned with the operational aspects of knowledge management. This is particularly evident in the arbitrary nature of learning activities, the information reporting orientation of the technology infrastructure, and the lack of incentives for knowledge sharing.

PolyChem's codification knowledge orientation, represented in purple, is misaligned with the goal of better decision making, and the technology infrastructure does not support the codification approach beyond information reporting at an operational level. Finally, PolyChem's enactment of knowledge processes, represented in turquoise, is largely

mechanistic and workflow-driven, with little attention being paid to the manner in which people naturally tend to create, share and use knowledge.

The interrelationships between these three dimensions of PolyChem's knowledge-centric capability thus explain the emergence of the Mechanistic capacity in their organisational context.

CHAPTER 10
FOURIER APPROACH: THE CASE OF A ROAMING CAPACITY

"If you don't know where you are going, you will probably end up somewhere else".

Laurence J. Peter

10.1 Introduction

The configuration of knowledge-centric capabilities of Cluster four, identified in Chapter 5 and interpreted in Chapter 6, was labelled a Roaming capacity because even though knowledge is viewed as a strategic resource, the execution of knowledge-related activities appears to be undirected. This chapter discusses the Roaming capacity as an archetype of knowledge-centric organisations by presenting a case study to explain the emergence of a Roaming capacity in a specific knowledge-intensive organisation.

10.2 Case selection

Thirteen organisations met the criteria, previously defined in §4.6.2, of a minimum of ten completed questionnaires, of which only four organisations met the combined criteria of having at least 35% of its observations in the Roaming capacity with at least a 10% decrement to the closest group, as presented in Table 10.1.

Table 10.1: Organisations with primarily a Roaming capacity

		Holistic		Peripheral		Mechanistic		Roaming		
Company	**Industry**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**Total**
Mineco R&D	Resources	39.47%	15	13.16%	5	26.32%	10	21.05%	8	**38**
W1 Engineers	Consulting engineering	48.48%	16	6.06%	2	27.27%	9	18.18%	6	**33**
T1 Enigineers	Consulting engineering	24.00%	6	16.00%	4	24.00%	6	36.00%	9	**25**
FuturaSoft	Software services	40.91%	9	0.00%	0	4.55%	1	54.55%	12	**22**
Ceder & Kirk	Legal services	42.86%	9	9.52%	2	33.33%	7	14.29%	3	**21**
XactSoft	Software services	25.00%	5	20.00%	4	20.00%	4	35.00%	7	**20**
PharmaLab	Pharmaceutical	10.00%	2	50.00%	10	20.00%	4	20.00%	4	**20**
Z Partners	Legal services	30.77%	4	15.38%	2	23.08%	3	30.77%	4	**13**
PolyChem	Chemicals	7.69%	1	23.08%	3	46.15%	6	23.08%	3	**13**
Fourier Approach	Software services	25.00%	3	16.67%	2	0.00%	0	58.33%	7	**12**
F1 Engineers	Consulting engineering	45.45%	5	0.00%	0	9.09%	1	45.45%	5	**11**
Fundamo	Software services	0.00%	0	81.82%	9	9.09%	1	9.09%	1	**11**
X-Mobile	Software services	20.00%	2	50.00%	5	10.00%	1	20.00%	2	**10**
ChemWorx	Chemicals	25.00%	2	0.00%	0	37.50%	3	37.50%	3	**8**
X-Pharma	Pharmaceutical	40.00%	2	0.00%	0	20.00%	1	40.00%	2	**5**
PhantamSoft	Software services	0.00%	0	25.00%	1	25.00%	1	50.00%	2	**4**
Y Partners	Legal services	33.33%	1	33.33%	1	33.33%	1	0.00%	0	**3**
SFT-Ware	Software services	50.00%	1	0.00%	0	50.00%	1	0.00%	0	**2**
M-Connectiv	Software services	0.00%	0	100.00%	2	0.00%	0	0.00%	0	**2**
Secura	Software services	0.00%	0	0.00%	0	0.00%	0	100.00%	1	**1**
Total			**83**		**52**		**60**		**79**	**274**

The four organisations all indicated that they would consider participating in a case study. Three organisations, namely T1 Engineers, FuturaSoft and XactSoft could however not meet the deadlines to participate in the case study interviews, and Fourier Approach was therefore selected as the case study participant for the Roaming capacity. With 58% of Fourier Approach's responses clustering in the Roaming capacity, it is the most representative case for this configuration of knowledge-centric capabilities.

10.3 Case background

Fourier Approach or Fourier in short, is a private company that provides consultation services in the field of information systems management, more specifically in the field of industrial engineering. The company was founded in 1999 through the merger of a number of individual consulting practices and currently employs 52 people. Industrial engineering consultation provides the main stream of revenue and the staff complement is mostly industrial engineers and computer scientists.

Fourier provides consultation services in seven disciplines, namely business process management, simulation, information management, information infrastructure, system acquisition, workflow and business intelligence. The company has built-up experience in a number of industries, including the logistics engineering industry, the facilities management industry, the real estate management industry, financial services industry, trade union industry and the mining industry. Fourier has an international client base with clients in South Africa, the United Kingdom, France and the United Arab Emirates. Fourier is also in partnership with a number of technology firms and is a Microsoft Gold Certified Partner.

Technological change is considered a key driver in the industry in which Fourier operates, necessitating a constant awareness of the latest software developments in their field. The rapid rise of open source software is an example where Fourier recently had to decide whether to start building a capacity in open source software or not. Another key driver is the availability of skills. South Africa is experiencing an engineering skills shortage, including industrial engineers. This makes the niche market of industrial engineering consultation more attractive, but at the same time poses a challenge to Fourier to recruit and retain industrial engineers. Fourier views its in-house developed methodology as a way to differentiate itself in a highly competitive market and believe it is a critical contributor to the company's success.

Fourier's knowledge management initiative resides with the Managing Director and focuses on creating organisational expertise in the seven disciplines within which it operates. The initiative is driven through a company portal, which consists of four repositories. In the company repository all company-related information is stored, including templates for proposals. The marketing repository contains information pertaining to the marketing function and includes actual project proposals. The third repository contains all discipline-related information. Employees are expected to capture the information in the relevant areas of so called "Technical Wheels" comprising methodology, tools, training and deliverables. The project repository is the fourth repository. For each new project, a designated section is created in the project repository and all relevant project documentation must be stored here.

The case background has presented an overview of how knowledge management is deployed in Fourier. This provides a backdrop for studying the emergence of the Roaming capacity. The analysis and discussion that follows clearly demonstrates why Fourier's knowledge-centric capabilities emerged as a Roaming capacity.

10.4 Data analysis

The data for the case study were mainly collected through a semi-structured interview with the Managing Director, and a focus group session with five employees who also participated in the knowledge management survey. The case study participants' survey responses clustered to Cluster 4, the Roaming capacity.

The interview and focus group session were conducted in Fourier's head office in Pretoria, South Africa. Secondary data were obtained from company information available in the public domain, including the company's website and press releases.

Video recordings of the interview and focus group session were transcribed using InqScribe and the transcriptions of the interviews were coded in as described in §4.6.4. From the codes, case-specific themes were identified. Comparative higher order themes were identified across all four cases, while the case-specific themes vary from one case to the next, as illustrated in Figure 10.1.

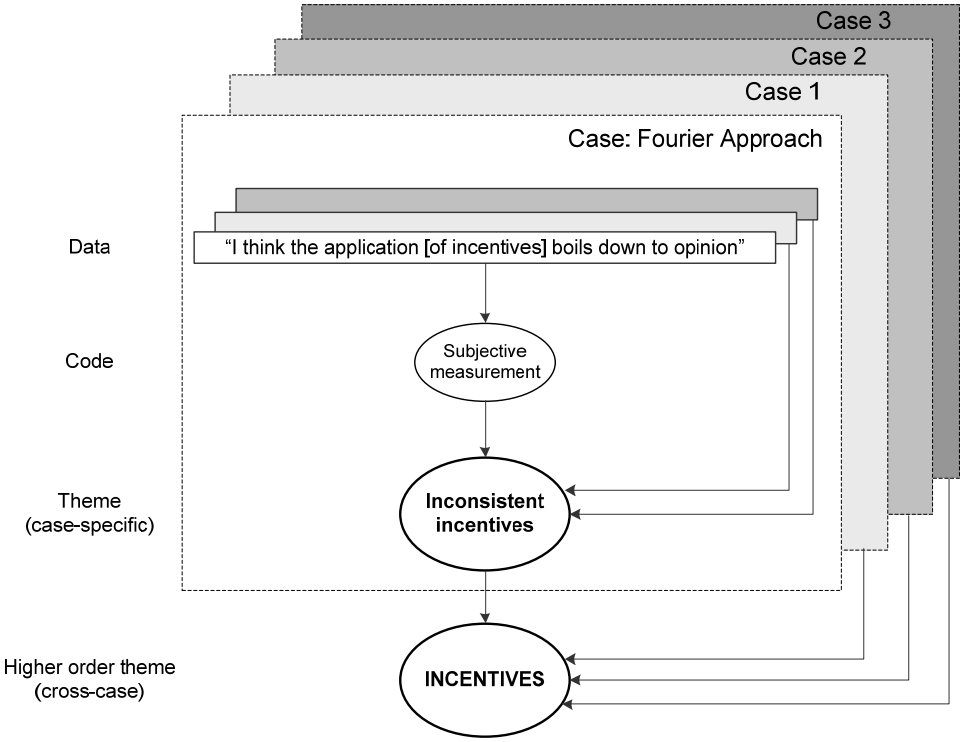

Figure 10.1: Example of the thematic data analysis

Figure 10.3 illustrates the mapping of the comparative main themes, in the second tier, and the case-specific themes, in the third tier, to the three dimensions of the knowledge-centric capability framework in the first tier, and the five sub-systems of a viable system in the fourth tier.

In analysing the data the emphasis fell on identifying the factors that influence the knowledge-centric capability of the organisation. From the thematic analysis, five case-specific themes emerged in the Intent dimension of the knowledge-centric capabilities framework, namely Conceptual strategy, Undefined structure, Arbitrary learning culture, Inconsistent incentives and Inadequate technology. One theme, namely Codification knowledge approach, emerged in the Orientation dimension and one theme, Uncoordinated knowledge processes, emerged in the Enactment dimension.

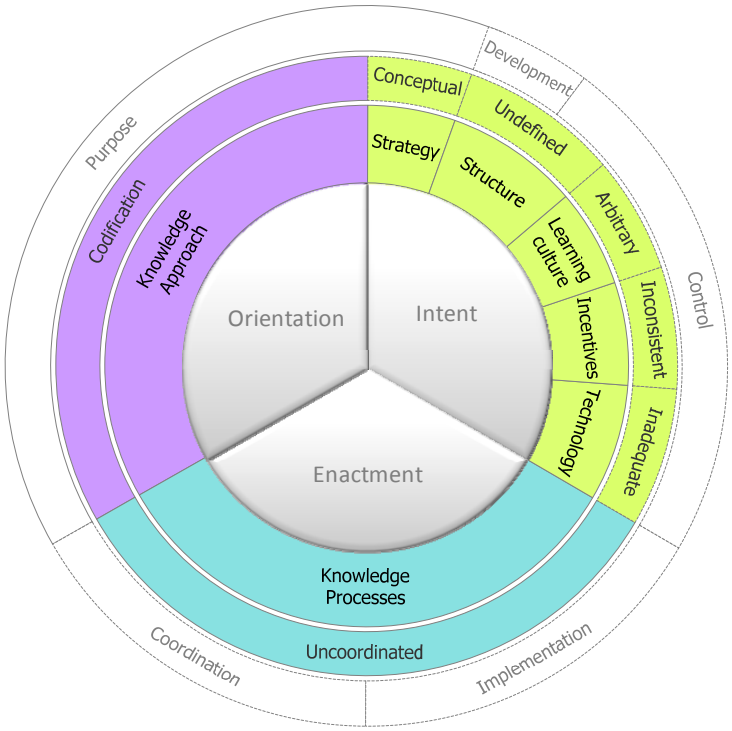

Figure 10.2: Thematic analysis of the Roaming capacity of Fourier

On their own, however, the themes do not explain the emergence of the Roaming capacity. Next the chapter therefore turns to exploring and discussing the interrelationships between the various themes.

10.5 Discussion

10.5.1 Interrelationships

The discussion that follows explains why the Roaming capacity emerged as a configuration of knowledge-centric capabilities in a specific organisational context, by exploring each of the themes and their interrelationships. Each of the themes and the underlying interrelationships are discussed next. Themes are discussed on the hand of a graphical representation of the theme, as outlined in Figure 10.3.

The theme is presented in the centre of the diagram, while the codes are presented in the middle-tier. The references to the data are presented in the outer-tier, with a ‘G’ referring to the focus group transcript and an ‘I referring to the interview transcript.

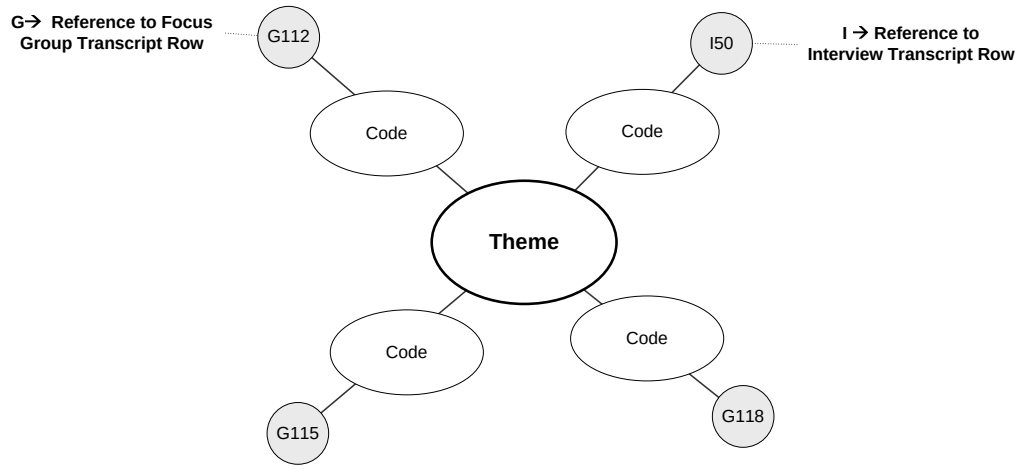

Figure 10.3: Anatomy of the theme representations

The number following the 'G' or 'I' refers to the row in the corresponding transcript. The list of codes is presented in Appendix J and the list of themes is presented in Appendix O. The transcripts are presented in Appendix F.

In order to provide a clear presentation of the interrelationships, the thematic analysis presented in Figure 10.2 is unpacked in an organising framework. This affords the opportunity to make sense of the data and case study themes within the dimensions of the knowledge-centric capability framework originally presented in §3.6, which also served as the theoretical base for the case study questions.

The interrelationships between the various themes that emerged in Fourier Approach are illustrated in Figure 10.4.

The mapping to the knowledge-centric capability framework is visible in the green blocks, representing the Intent dimension, the purple blocks, representing the Orientation dimension and the turquoise blocks, representing the Enactment dimension. The mapping to the 'organisation-as-a-viable-system' view is visible in the five sub-systems of the Viable Systems Model, namely Purpose, Development, Operational control, Coordination and Implementation.

The statements from which the respective themes emerged are numbered within each theme block, while the interrelationships are represented by the black and white connectors, numbered one through seven.

Each of the themes and the respective interrelationships are discussed next.

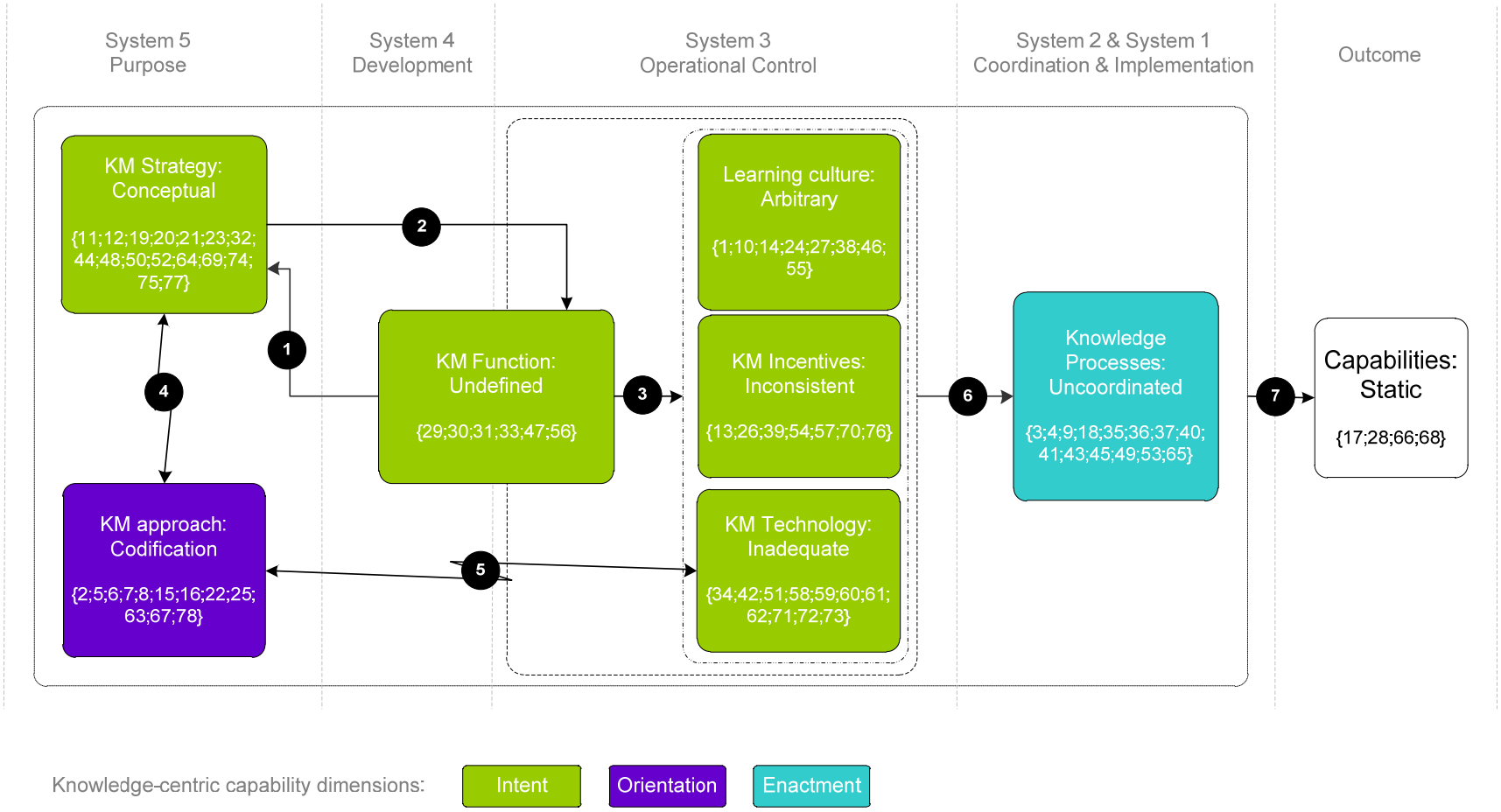

Figure 10.4: Interrelationships between Fourier's themes

10.5.2 A conceptual knowledge management strategy

A formal, clearly articulated knowledge management strategy is a key success factor to any knowledge management initiative (Davenport, *et al.*, 1998; 2003; Skyrme & Amidon, 1997; Wong & Aspinwall, 2005) and the lack thereof can act as an inhibitor to an organisation's knowledge-centric capability in a number of ways. Fourier's knowledge management strategy seems to be pinned at a conceptual level. The conceptual nature of Fourier's knowledge management strategy emerged from sixteen lower-level themes, as illustrated in Figure 10.5.

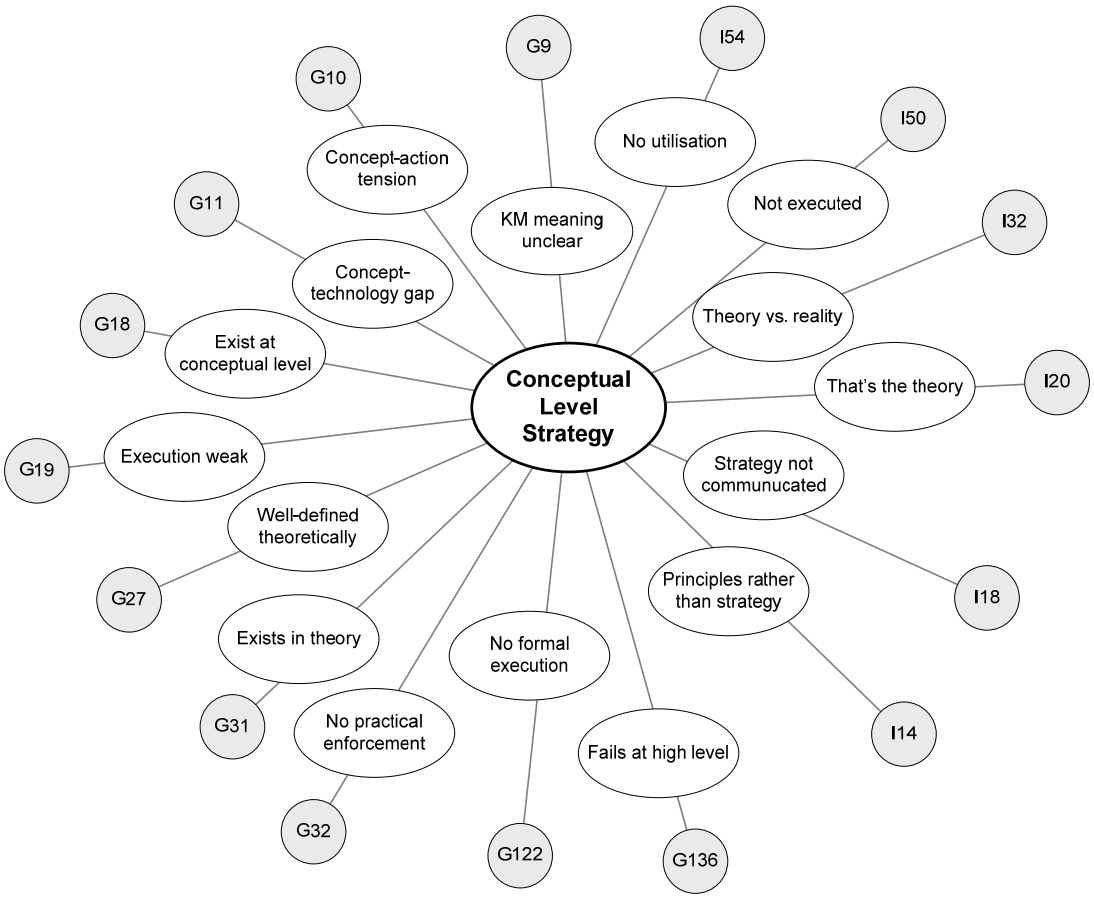

Figure 10.5: Emergence of the conceptual knowledge management theme

Agreement exists throughout the company about the importance of knowledge management, yet the prevailing thought is that it falls short on execution. This can be attributed to the fact that the company does not have a formal knowledge management strategy in place, as the Managing Director explains:

"It is more a principle than it is a formal strategy. I don't have a strategy document that states what the knowledge management strategy is". (Appendix G:I14).

This lack of direction in terms of knowledge management results in a culture of uncertainty as far as the importance of knowledge management is concerned. This is evident from the focus group's comments. The participants were in agreement that knowledge is an important resource to Fourier, and it was clear that knowledge management has been established as a concept in Fourier, but that the enactment falls short. The focus group concurred:

> *"It's a great concept. Conceptually we all know why, and people are putting in data for different reasons out of their concepts of knowledge management, but then the utilisation sits a bit short". (Appendix G:G10).*

A serious consequence of the uncertainty about knowledge management expectations is the limited commitment to knowledge management activities, evident in the following explanation from the focus group:

> *"I think it's because we don't see it as working. We do not value it as work, so that is why you rather work. We need to get it to a level where that is also 'working'". (Appendix G:G33).*

The Managing Director also acknowledged that knowledge management often received a low priority in the organisation:

> *"We wear many hats and then one starts to prioritise and someone says 'listen, it's more important to do the marketing properly than to do knowledge management". (Appendix G:I22).*

From a viable system perspective, as discussed in §3.6.5, a knowledge management strategy forms part of System 5 - Purpose, which is responsible for the direction of knowledge management within the organisation. The lack of a clearly formulated knowledge management strategy highlights a weakness in Fourier's System 5 and thus begins to explain the apparent lack of direction as far as knowledge management is concerned. Such a short term focus is quite common in small and medium enterprises (Nunes, *et al.*, 2006) and often filters through to employees, as is evident from the observation of a focus group participant:

"It's just that I think in the short term, currently, we feel the unstructured way of doing knowledge management works for us, and that is why we stick to it. I do however think it is selfish not to think about the impact of this in the long term". (Appendix G:G137).

10.5.3 An arbitrary learning culture

Organisational learning plays an important role in the emergence of dynamic capabilities (Eisenhardt & Martin, 2000; Teece, *et al.*, 1997; Zollo & Winter, 2002). Fourier however does not have formal activities in place to foster a learning culture within the organisation. The arbitrary nature of Fourier's learning culture emerged from nine lower-level themes, as illustrated in Figure 10.6.

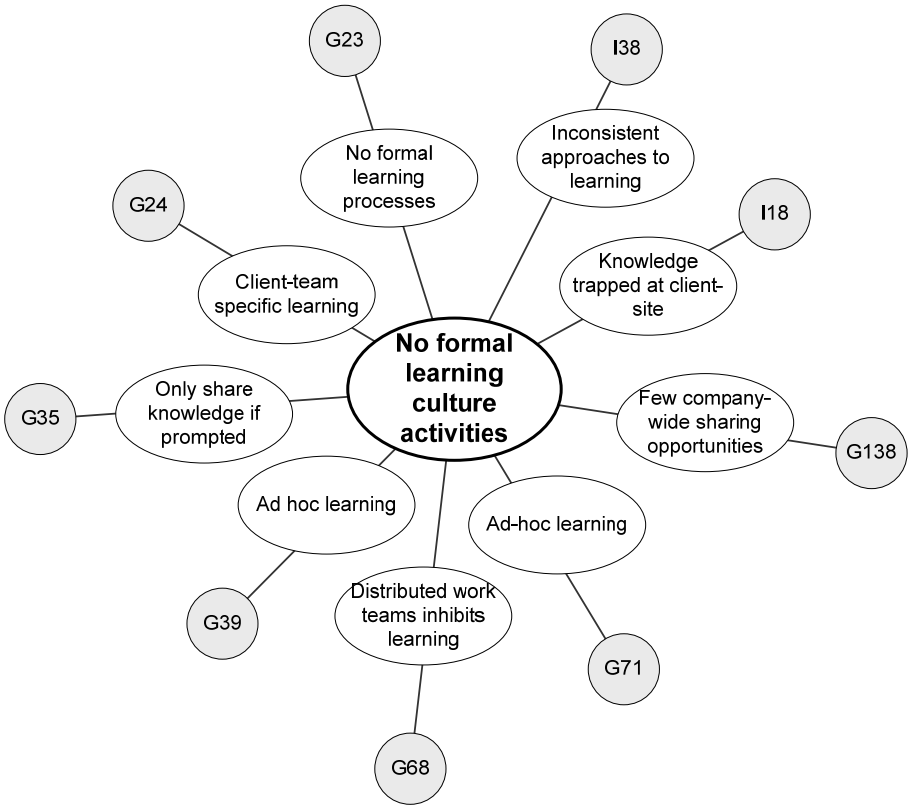

Figure 10.6: Emergence of the arbitrary learning culture sub-theme

Formal training is seldom provided for knowledge management activities and the direction in which knowledge should be developed is also seldom communicated. This lack of "translation" of the purpose of knowledge management contributes to knowledge management activities remaining pinned at a conceptual level.

One respondent explained:

> *"At that high-level we already do not know which direction. […] Does it mean we only have to put the documents we think are 'nice practices' on the portal and forget about it?" (Appendix G:G9).*

Employees also seldom receive feedback on knowledge initiatives. This is again echoed by a participant:

> *"I know the stuff is there, but it is as if nothing happens within the framework of knowledge management. So it is a matter of things are happening, but I don't know what is happening with it; whether it is used or not." (Appendix G:G9).*

Informal learning activities, for example asking others for assistance when needed, and encouragement to discuss work with people in other teams are more prevalent in Fourier. This can be attributed to the way work is structured in the organisation. Employees work at the clients' sites and seldom have formal contact with colleagues working at another client site. One respondent reflects:

> *"I mean, when last was I at one of the Fourier functions down here? He and I are in the south of Johannesburg. He is now in central Johannesburg for most of his time. I don't talk about you, because you're just around the corner; and I don't know where you're based at the moment. But here everyone is together for sort of a semi-formal afternoon. He discovered what the traffic is like. He left the client at two o'clock – it's expensive in the long run. It's the nature of where we work at the moment." (Appendix G:G68).*

The dispersed character of Fourier's work environment poses a challenge to creating opportunities for effective learning activities, particularly generating and sharing tacit knowledge. As discussed in §2.2.5, knowledge is both personal and social, which means knowledge creation and sharing is dependent on personal interaction. Physical separation thus is a critical barrier to sharing tacit knowledge (Leonard & Sensiper, 2002), which can partly be overcome by the effective use of social networking technology.

The Managing Director however attributes the fragmented and incidental nature of the learning culture to differences in management culture:

> *"I don't think that is what I would like it to be. But the fact that it turned out that way is probably a question of line management culture". (Appendix G:I38).*

This illustrates the problematic relationship between the conceptual nature of Fourier's knowledge management strategy and the operational aspect of knowledge management, more specifically the learning culture, as presented by connector 3 in Figure 10.4. As a component of System 5, a knowledge management strategy should not only articulate the purpose, but also the identity or ethos of the whole system to the wider system of which it is part (Jackson, 2003). The existence of different management cultures in Fourier emphasises System 5's inadequacy in this regard.

10.5.4 Inconsistent incentives

Rewards and incentives are considered important components of the knowledge management process (Argote, *et al.*, 2003; Davenport, *et al.*, 1998; Liebowitz, 1999b; Lucas & Ogilvie, 2006; Skyrme & Amidon, 1997) and should be aligned to an organisation's knowledge management objectives.

The inconsistent incentives theme emerged from seven lower-level themes, as illustrated in Figure 10.7.

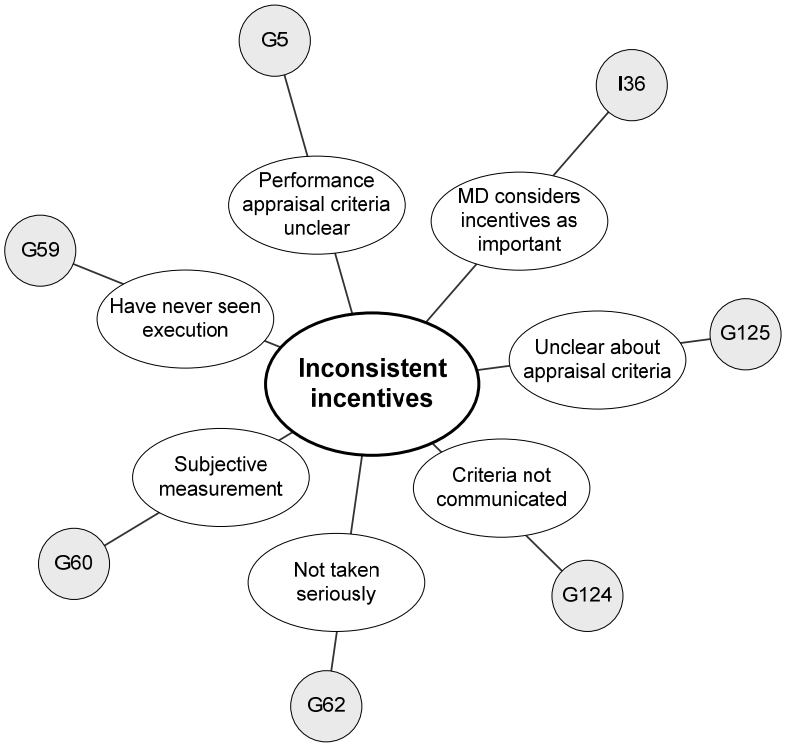

Figure 10.7: Emergence of the "Inconsistent incentives" sub theme

In Fourier, the goal is to use incentives to encourage the creation, sharing and application of organisational knowledge. The Managing Director explains:

> *"Look, it's a way we try to create an incentive. I told the line managers 'listen, as part of the appraisal I want questions such as is the person's stuff here, does he use the portal, and does he put his information in there when he is doing work' and if it isn't done, he should give them a hiding. That's basically a way to try to encourage it." (Appendix G:I36).*

The reaction from the focus group however suggests that the execution falls short and highlights the emergence of the inconsistent implementation of incentives as a theme in Fourier. When probed about the mechanisms that are in place to encourage knowledge sharing, after some laughter the general feeling was that although knowledge sharing is part of their key performance indicators, it is not implemented in a consistent manner. While gesturing a sign of money, the one respondent proclaimed:

> *"We've never seen the execution." (Appendix G:G59).*

Members of an organisation will only continue to volunteer their contributions as long as the incentive for doing so is adequate in terms of their own personal goals (March & Simon, 1958; Pfeffer, 1997). Inconsistent incentives are therefore likely to influence the manner in which knowledge-related activities are performed as well as the priority it will receive.

10.5.5 Inadequate knowledge management technology

Organisational knowledge management and its underlying processes can be enhanced and supported through a well-developed technical infrastructure (Alavi & Leidner, 2001; Alavi & Tiwana, 2003; Davenport, *et al.*, 1998; Liebowitz, 1999b; Skyrme & Amidon, 1997; Zack, 1999b). The inadequacy of knowledge management technology in Fourier emerged as a theme from twelve lower-level themes, as illustrated in Figure 10.8.

Fourier's knowledge management initiative is largely structured around the use of a portal as a central knowledge base. Although the technology is in place, it is not adequately aligned with Fourier's organisational context.

A line manager explains:

> *"We have the portal, but I think the portal doesn't work for anyone. It could just as well have been a file server where the stuff gets stored. It doesn't really support our business. (Appendix G:G27).*

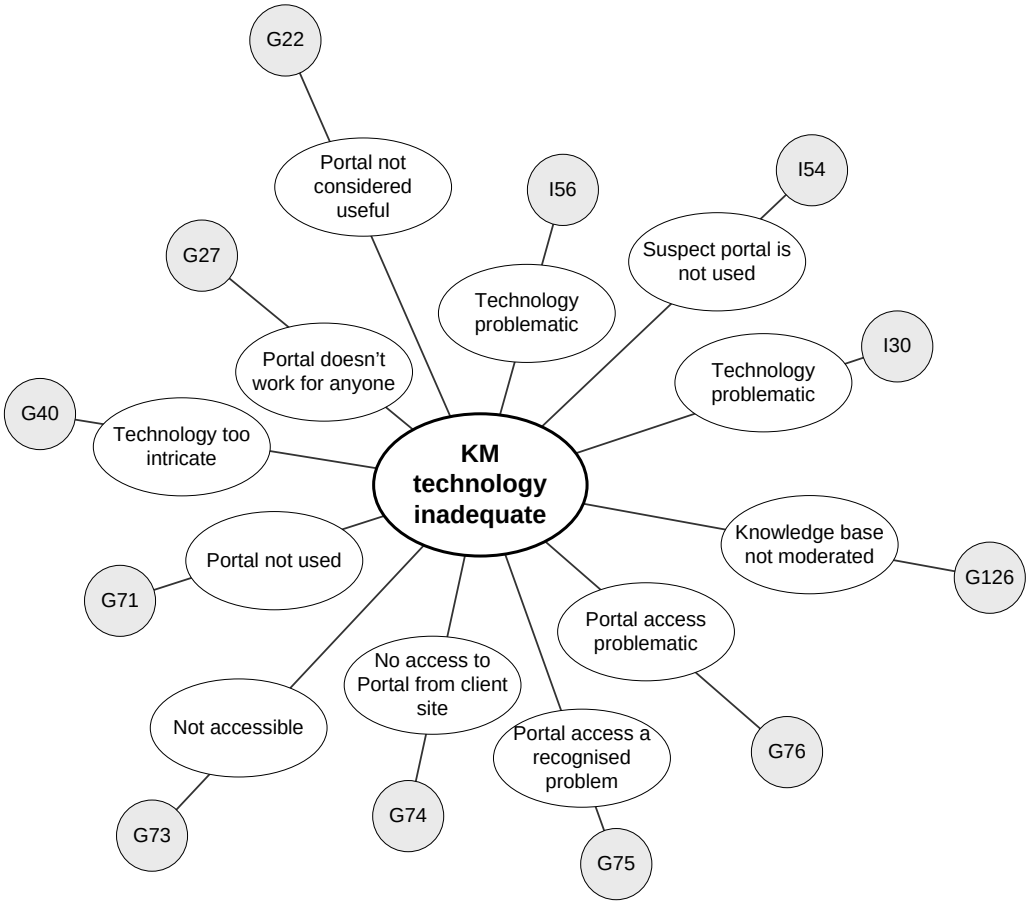

Figure 10.8: Emergence of the 'Inadequate KM technology' sub theme

The apparent misalignment between the technology that is used and the specific context of the organisation is further highlighted by the fact that the employees work at the clients' site, but at the same time are experiencing problems accessing the portal. In response to the question whether employees had access to the portal from the clients' site, one person responded amidst general laughter:

"Now THAT's a good question". (Appendix G:G73).

Another respondent concurred:

"I did not want to raise it here, but we seriously do not have access. […] We struggle a lot to get in." (Appendix G:G74).

As discussed in §10.5.3 Fourier's learning culture, particularly sharing tacit knowledge, is already hampered by the distributed nature of its workforce. The fact that the knowledge base

is not accessible from the client's site extends the problem to the sharing of explicit knowledge.

10.5.6 An undefined knowledge management function

Knowledge management leadership, which includes a formal knowledge management function, is often cited as a key success factor for knowledge management initiatives (Davenport, *et al.*, 1998; Holsapple & Joshi, 2000; Liebowitz, 1999b; Ribière & Sitar, 2003; Skyrme & Amidon, 1997). In Fourier an undefined knowledge management function emerged as a theme from six lower level themes, as illustrated in Figure 10.9.

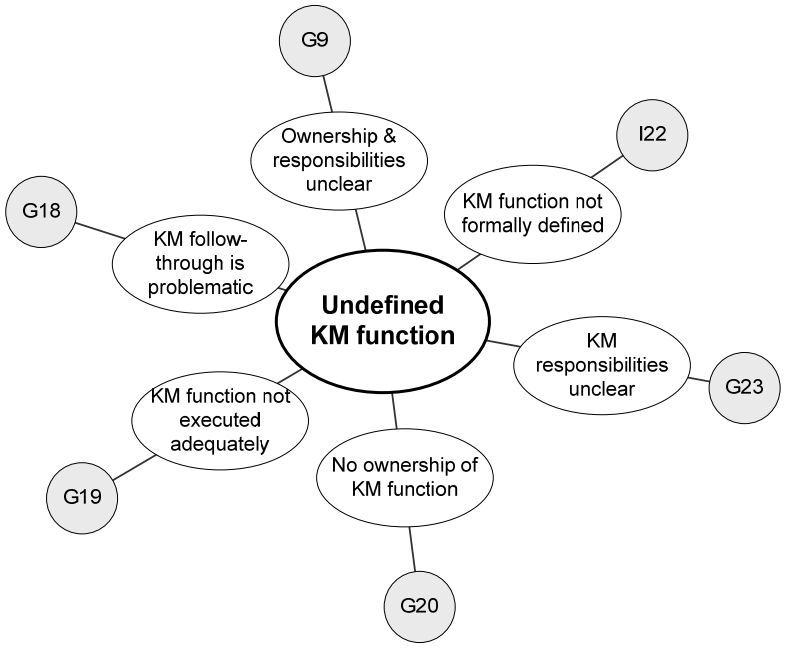

Figure 10.9: Emergence of the 'Undefined KM function' theme

The knowledge management function and structure is undefined, and the output, roles and responsibilities regarding knowledge management are not clearly communicated.

The MD explains:

> *"I think we don't really have a knowledge management function. If one says a 'formal function' then there typically is someone with a specific role; someone in a management function, and we wear many hats. The knowledge management function actually resides with me, just like quality management and HR. […] there is such a responsibility, but it's not necessarily on the organogram and maybe that's why some*

> *guys say there isn't something like that. In my mind, I have no doubt that it exists*". *(Appendix G:I22).*

This statement is characteristic of most small organisations where people are expected to fulfil more than one role. The implication for knowledge management is that, without a formal knowledge management strategy that gives direction, the lack of a formal structure makes it even more difficult to focus the knowledge management effort. This is clearly evident from the response in the focus group:

> *"Who is the owner of this thing? We don't even know who is actually managing it" (Appendix G:G9).*

The lack of a formal knowledge management function holds significant implications for the knowledge-centric capability of Fourier, as is evident from the interrelationships between knowledge management strategy, development and the operational control of knowledge management. These interrelationships are represented in Figure 10.10 by connector (1), connector (2) and connector (3).

In §2.3 the organisation was explored as an open, goal-seeking system. The ability to align itself to its environment was identified as a requirement for an organisation to remain viable. This is achieved through a process of organisational learning (Daft & Weick, 1984; Fiol & Lyles, 1985) which involves scanning the environment and providing data to managers, giving meaning to the data through interpretations, and learning which means taking action based on the interpretation.

The first interrelationship, represented by connector 1 in Figure 10.10, emerged between the conceptual knowledge management strategy and undefined knowledge management function, which can respectively be mapped to the purpose and development sub-systems of a viable system, as shown in §3.6.5. Connector 1 represents the impact of the absence of a formal knowledge management function, which corresponds to the absence of System 4 (Development). As discussed in §2.3.3, System 4 typically has to provide a structure for bringing together knowledge about the external and internal environment which should form the basis for decision making and strategy formulation (Beer, 1972; Jackson, 2003). The absence of this function in Fourier means that System 5, which is responsible for formulating the knowledge management strategy, doesn't receive information from System 4 and the knowledge management strategy can therefore not be based on information about Fourier's

total environment. This absence of what Daft and Weick (1984) call the scanning stage in the learning process, means the Fourier's knowledge management strategy will not be adequately informed about changes in the environment, hampering decision making and hence it will be difficult to align the knowledge management strategy with changes in the environment.

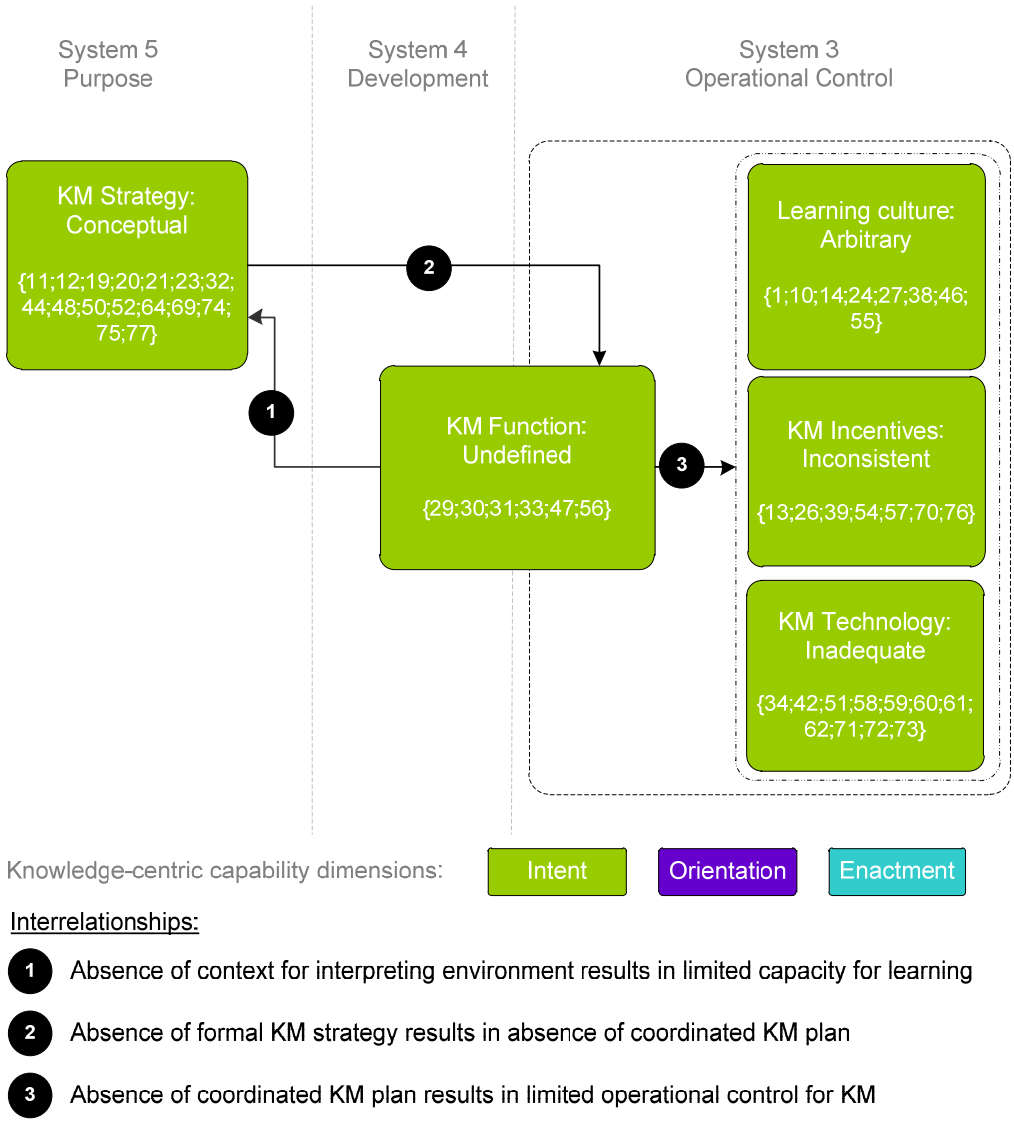

Figure 10.10: Interrelationships between Strategy, Function and Control

The lack of a formal knowledge management function in Fourier, where internal and external knowledge can be consolidated, thus limits the company's capacity for double-loop learning because it lacks a model of the environment it faces, and therefore the ability to respond to changes in the environment. This is confirmed in the literature (Daft & Weick, 1984; Fiol &

Lyles, 1985) where it is argued that the lack of a context for interpreting the internal and external environments typically results in a limited capacity for learning.

The second interrelationship, represented by connector 2, presents the absence of a coordinated KM plan and emerged between the conceptual nature of the knowledge management strategy and the part of the knowledge management function responsible for operational control. As discussed in §3.6.5, in a viable system the control function is not responsible for initiating the knowledge management strategy, but rather to interpret it and to pass a coordinated plan on to the business units for implementation (Beer, 1994; Jackson, 2003).

In §10.5.2 however we saw that Fourier doesn't have a formal knowledge management strategy. Instead, the Managing Director rather described it as a guiding principle. Although this is characteristic of many small and medium enterprises (Nunes, *et al.*, 2006), even guiding principles need to be converted into some form of a coordinated plan of action, and this doesn't seem to be the case in Fourier. The fact that the knowledge management strategy is viewed by case participants merely as a concept lacking execution highlights the absence of a formal knowledge management control function in Fourier. The focus group discussion highlighted the lack of knowledge of a coordinated knowledge management plan:

> *"I think that is the start of our problems with knowledge management; at that high-level already we do not know which direction to follow; what the fact that we are now doing knowledge management is supposed to mean". (Appendix G:G9).*

The third interrelationship, namely limited operational control for knowledge management, is represented by connector 3. It emerged between the undefined knowledge management function and three other components of operational control, namely learning culture, incentives and technology. The discussion in §2.3.3 showed that, in a viable system, the operational control system is responsible for interpreting the strategy and communicating it as a coordinated plan to business units for implementation (Beer, 1994; Jackson, 2000). In Fourier the conceptual nature of the knowledge management strategy renders a meaningful interpretation of the strategy difficult, resulting in the absence of a coordinated knowledge management plan.

This is particularly evident in three components of operational control. First the arbitrary nature of Fourier's learning culture shows that few coordinated processes are in place to

assist in establishing a learning culture, the importance of which has been discussed in §10.5.3.

Second, the inconsistent nature of knowledge management incentives in Fourier shows the lack of a coordinated approach to knowledge management incentives:

> *"When it comes to the review and you must be awarded a point out of five, your manager will say: 'you did not really have time for this, let's give you a five', and then you move on to the next point." (Appendix G:G62).*

This also highlights a weakness in the auditing role of System 3. As discussed in §2.3.3, the auditing role needs to ensure that targets specified by System 3, in Fourier's case the guidelines for knowledge management incentives, are being adhered to (Beer, 1994; Jackson, 2003). Inconsistent implementation of knowledge management incentives however means little insight is available in Fourier about the true performance of knowledge-related activities.

Finally the inadequacy of the technology used by Fourier, as discussed in §10.5.5, highlights the lack of a coordinated plan for the use of knowledge management technology. This is particularly significant in the light of the codification approach followed by Fourier, discussed next.

10.5.7 A codification knowledge management approach

As discussed in §2.2.5 and §2.2.6, knowledge is personal, social and context-specific and tacit knowledge cannot be converted into explicit knowledge without losing some important meaning (Cook & Brown, 1999; Polanyi, 1958; Tsoukas, 2003). This of course does not mean that certain knowledge cannot be codified. Explicit knowledge, however, fulfils a different epistemological role than tacit knowledge. Fourier's knowledge management initiative only comprises a codification approach. The 'Codification' sub theme emerged from twelve themes, as illustrated in Figure 10.11.

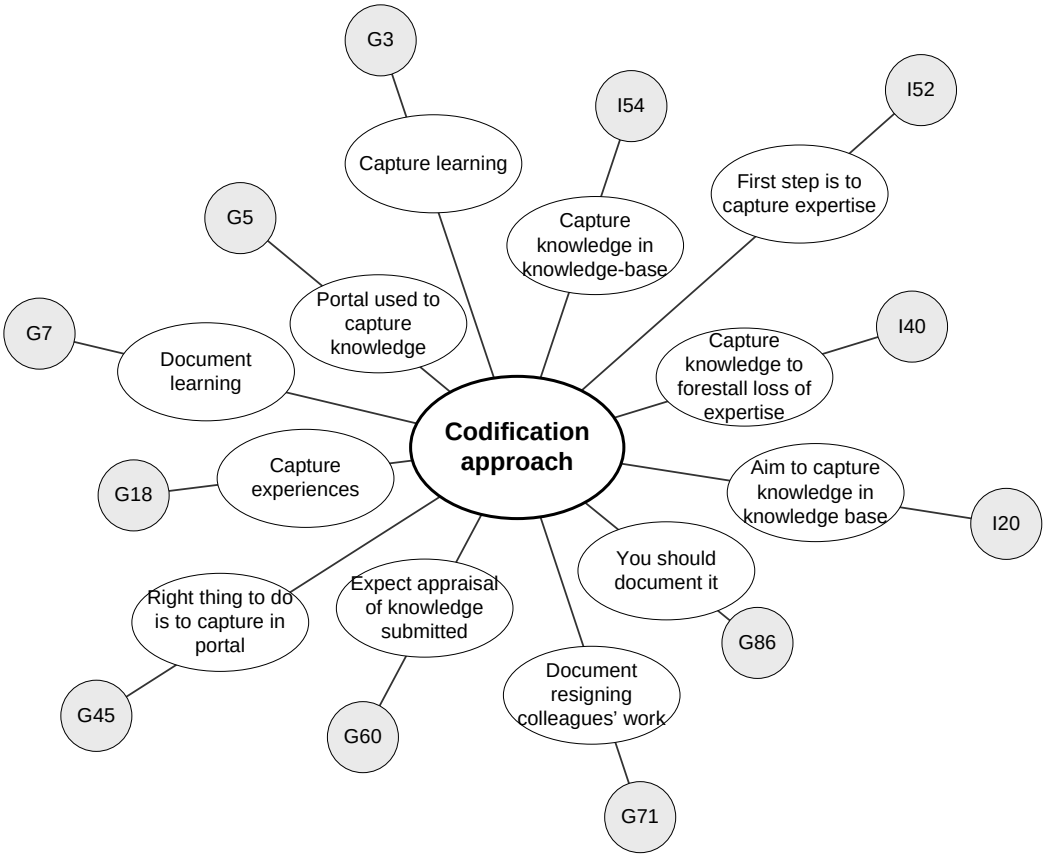

Figure 10.11: Emergence of the 'Codification' subtheme

The portal is seen as synonymous with knowledge management, as is evident from these comments:

> *"[…] and that we will use the portal for that". (Appendix G:G5).*

> *"I think it was part of the portal idea, the physical space… a portal has been created where these things should be captured." (Appendix G:G7).*

> *"At least we are at a point where we are starting to capture the stuff." (Appendix G:I54).*

Fourier is thus trying to create organisational knowledge by codifying individual tacit knowledge. The Managing Director explains that the rationale behind this approach is to improve the quality of their services:

> *"You see, our people are all that we have. We do not have machines. They are all that we have and the better equipped and the more knowledgeable the people are, the better the*

level of service we can render. And that is why it is important that one supplements it (their expertise) in a way". (Appendix G:I40).

Haas and Hansen (2007) observes that the main benefit derived from codified knowledge is saving time, and that quality and competence is not improved in the process. It therefore seems that Fourier's codification approach is not aligned with their strategic intent for knowledge management.

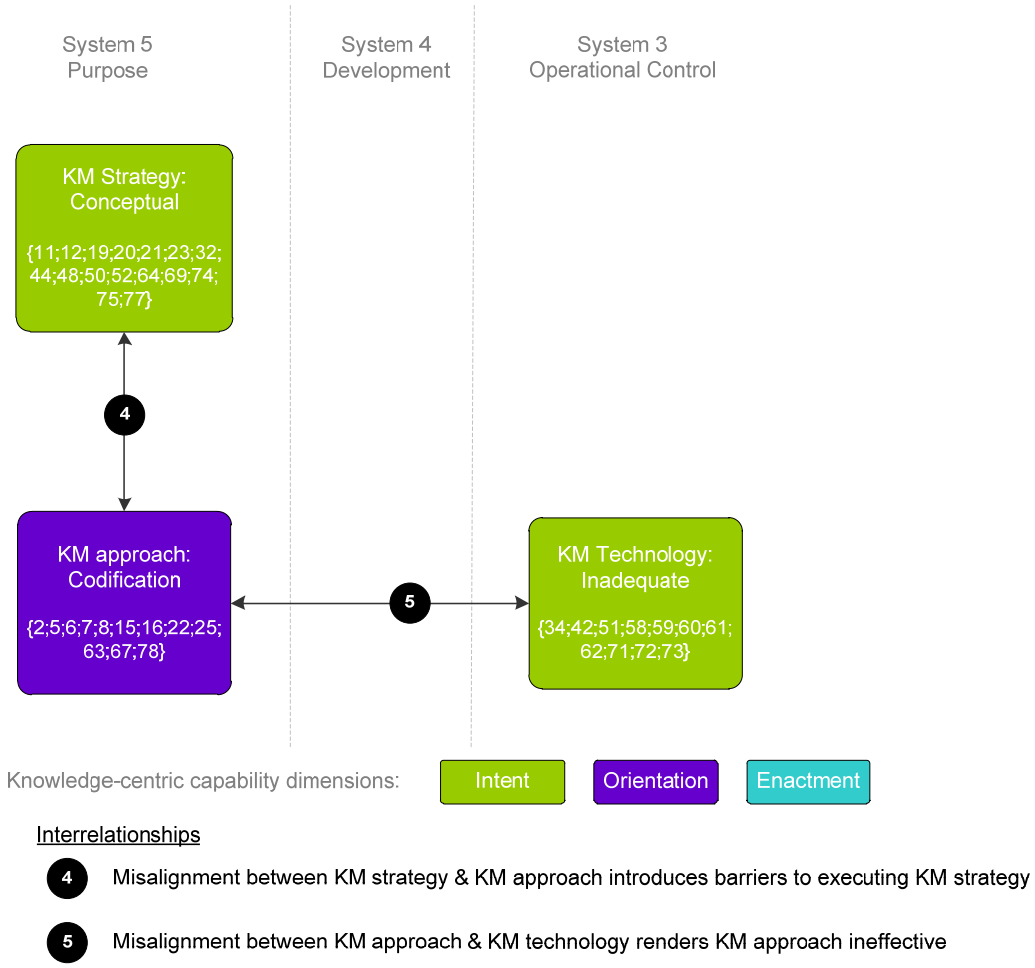

Figure 10.12: Interrelationships between strategy, approach and technology

The codification approach results in interrelationships between strategy, approach and technology, presented as connector 4 and connector 5 in Figure 10.12.

The misalignment of Fourier's conceptual knowledge management strategy and knowledge management approach is represented by connector 4. At a strategic level, Fourier views its in-house methodology as its key differentiator, describing it as institutionalised experience:

> *"What one should do is differentiate oneself, and we achieve this with our methodology, which is a component of knowledge management. Actually it is the institutionalised experience, the methodology of how we do things, how we develop, how we design systems, how we formalise it, how we deliver it. And these are the things we take to the market with great success and we have a track record". (Appendix G:I8).*

The methodology can thus be viewed as Fourier's "know-how", its tacit organisational knowledge. Yet, at the same time, Fourier follows a codification approach to knowledge management, hoping to capture explicit knowledge in a portal:

> *"We have technical areas, and within each technical area we have to formalise our expertise, and we have a repository for that. And if a guy wants to read something about it, he can look there. That is what it's about". (Appendix G:I12).*

Previous research by Hansen *et al.* (1999) found that organisations which deploy small teams as in Fourier's case rather make use of what they call a personalisation strategy, i.e. developing networks for linking people in order to share tacit knowledge. A personalisation strategy is therefore more in line with the view (Cook & Brown, 1999; Polanyi, 1958; Tsoukas, 2003) that knowledge is personal, social and context-specific, as discussed in §§2.2.5-2.2.6.

Within Fourier, however, opinions differ widely about what the approach to knowledge management should be.

Some of the focus group participants feel that tacit knowledge is more prevalent:

> *"That's how I see it -, it's something that somebody's built up with experiences. It's not in a book; it's a combination of four books and five clients. So it is skill and history, and I think that is what we're really selling". (Appendix G:G78).*

Other participants in turn feel that explicit knowledge should be more prevalent:

> *"But what you should do is that portion that's burning, you should document it. And the next time you should sort of fill the gaps type of thing. So at least in two or three years' time you have sort of these pieces of explicit information that you can start reusing". (Appendix G:G86).*

Even the Managing Director seems to be in two minds about what the most appropriate approach to knowledge management should be:

> *"That actually is a conflicting approach. There are people here that know a lot more than I do, and if they were to leave tomorrow, they will leave a huge gap. So now the challenge is to limit the size of the gap by capturing a bit of information so that you can tell his replacement where to find the information. But one can never capture the tacit stuff. That is why it is tacit – it is not formalised. As the saying goes, we are not managing a dam, but a river". (Appendix G:I40).*

It therefore seems that the misalignment between strategy and approach can be traced back to Fourier's failure to define and communicate the identity of the organisation in terms of knowledge management, which is a function of System 5 as discussed in §2.3.3.

A misalignment however also exists between the codification approach and the way in which technology is deployed (connector 5). As discussed in §10.5.5 employees do not have access to the portal from the clients' site, which also means that they cannot readily capture information in the portal. The technology thus does not support Fourier's codification approach to knowledge management. The various problems experienced by employees in using the portal, the foremost of which is the lack of access from clients' sites, highlights an insufficient investment of resources in the technology used for knowledge management. This is in stark contrast with Hansen *et al.'s* (1999) observation of heavy investment in information technology by organisations following a codification approach.

It is also interesting to note that in contrast to Fourier's case, previous research (Desouza & Awazu, 2006; Nunes, *et al.*, 2006) have shown that small and medium enterprises rarely use purposely designed information systems to support their knowledge management efforts.

10.5.8 Uncoordinated knowledge processes

The more dependent individual members of an organisation are on one another, the greater the need for effective group coordination (Foss & Mahnke, 2005; Pfeffer, 1997; Pfeffer & Salancik, 1978; Van de Ven, *et al.*, 1976). Also as the levels of task uncertainty or task variability increase, the effectiveness of impersonal coordination mechanisms such as rules, procedures, plans and schedules decrease and the need for personal and group coordination increase (March & Simon, 1958; Van de Ven, *et al.*, 1976). Effective coordination is therefore another key factor in an organisation's ability to survive and grow.

Fourier's knowledge processes are completely uncoordinated. This sub theme emerged from fourteen themes, as illustrated in Figure 10.13.

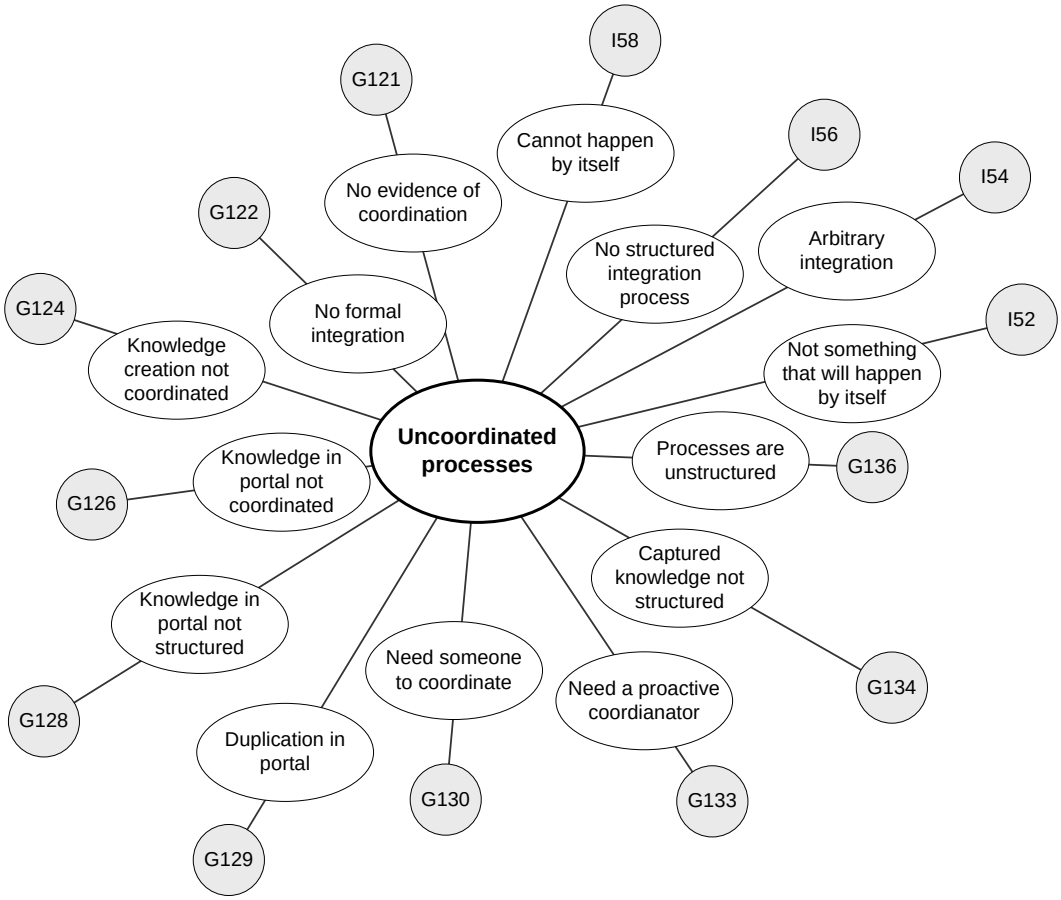

Figure 10.13: Emergence of "Uncoordinated processes" subtheme

Knowledge creation activities largely constitute capturing information in the portal. Employees are however unclear about precisely what information should be captured. One respondent laments:

> *"For me personally that is the foremost thing we do wrong. Actually we should know what is non-negotiable and what should be captured in the portal. But we don't know. […] We don't know. Never has it been communicated or explained what is non-negotiable, what is optional, and what will boost your bonus by 1 percent".(Appendix G:G124).*

Knowledge use activities are also unstructured and uncoordinated. No standard method of indexing documents exists in the portal. The lack of coordination results in employees not knowing where to find the documents as explained by the focus group:

> *"We'll take the same documents and identify the indexing differently and put it in a different sub-category, because he's got a different business interest to what I have, and therefore when he comes to look for it, he'll never find it, because he's got a third opinion" (Appendix G:G128).*

Another consequence of the lack of coordination of knowledge processes is that employees do not know which information they are supposed to use:

> *"I'll find ten links of the same thing and I won't know which one to use. Which one is the latest?" (Appendix G:G129).*

The uncoordinated knowledge processes emerged because of the limited operational control of knowledge management, as represented by connector 6 in Figure 10.14.

As discussed in §3.6.5, System 3 or the operational control function, is responsible for communicating a coordinated knowledge management plan to System 1 for implementation (Beer, 1994; Jackson, 2003). The absence of this control function in Fourier results in uncoordinated and unstructured knowledge processes. It also means that no oversight exist about the degree of effectiveness of the implementation of knowledge management and the distribution of resources.

The inconsistent use of knowledge in the portal in turn highlights the absence of System 2 which is responsible for knowledge management coordination. In a viable system, System 2 has the responsibility to ensure that the various parts of System 1, in Fourier's case the various teams, act in harmony as far as the knowledge environment is concerned (Jackson, 2000). The absence of such a coordination function is recognised by the focus group:

"But I think that is the problem exactly; if he is going to define that and says this is how it is going to work, then the guys will use it. When it is defined, we will know in which categories we have to put it. But the fact that he doesn't know, and he doesn't know and I don't know is the reason it is not working. So one actually need one person to say 'there you are – that's how it will work'." (Appendix G:G130).

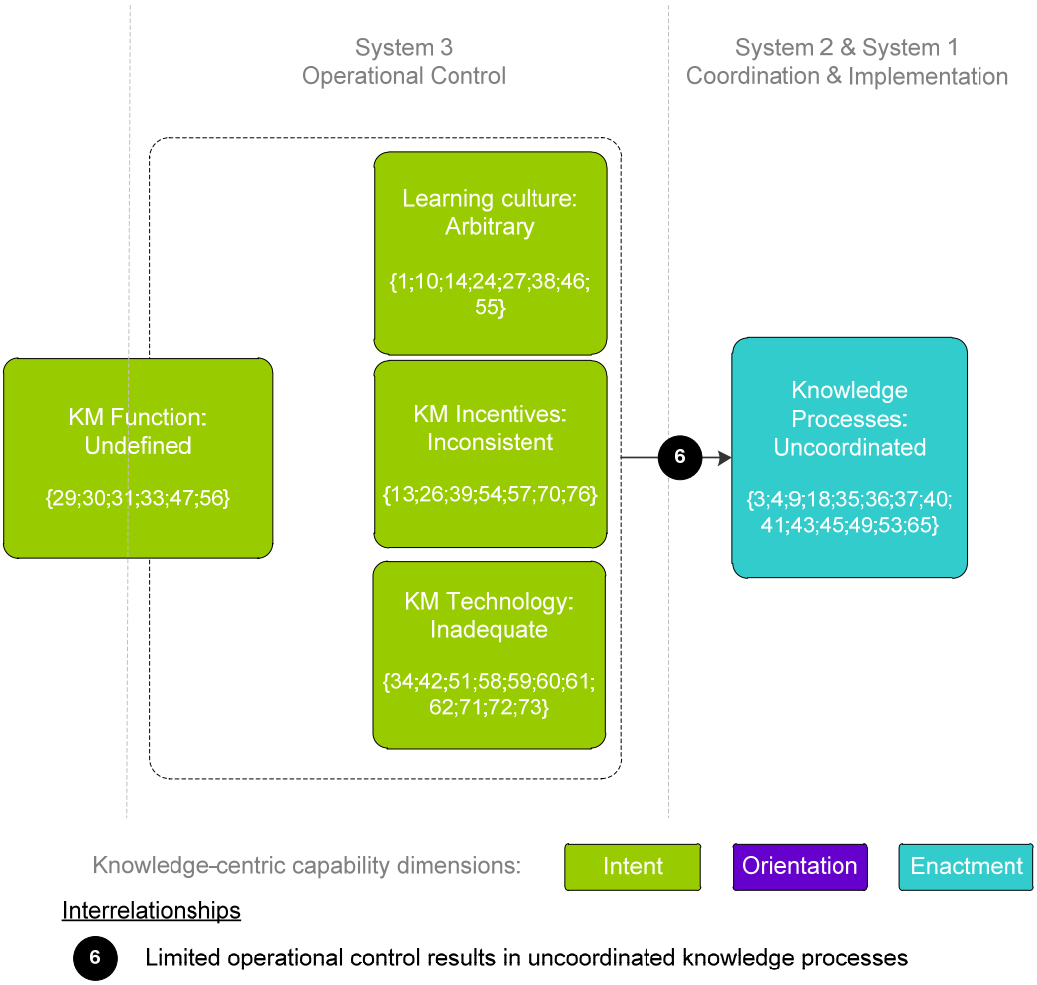

Figure 10.14: Interrelationship between operational control and processes

The lack of a coordination function has a significant impact on Fourier considering the distributed nature of their work environment where employees are deployed at different client sites. The impact is even more profound considering the findings of previous research (Leonard & Sensiper, 2002) which show that both physical and time separation introduces barriers to the sharing of tacit knowledge.

Furthermore, Fourier's employees are expected to capture their own knowledge, without any guidance about what should be captured. This approach is in stark contrast to the findings of Hansen *et al.* (1999) which show that organisations that follow a codification approach invest heavily in resources to ensure that the codification process runs in a coordinated and efficient manner. This is achieved through dedicating staff members to managing the electronic repository, helping employees find and use information, analysing information and helping employees to capture information and store documents.

It would therefore seem that if their codification approach were to succeed, Fourier is in need of not only a more adequate information technology infrastructure as discussed in §10.5.5, but also a more formal approach to coordinating knowledge processes.

10.5.9 Static capabilities

From the dynamic knowledge-based perspective discussed in §3.4, a sustainable competitive advantage can only be achieved through dynamic capabilities, i.e. if an organisation develops the ability to modify and renew its knowledge base by creating, integrating, recombining and releasing its knowledge resources in order to adapt to current changes or to effect change in its environment (Eisenhardt & Martin, 2000).

Fourier's capability to modify and renew its knowledge base can be described as static. The sub theme is evident from four statements, as illustrated in Figure 10.15.

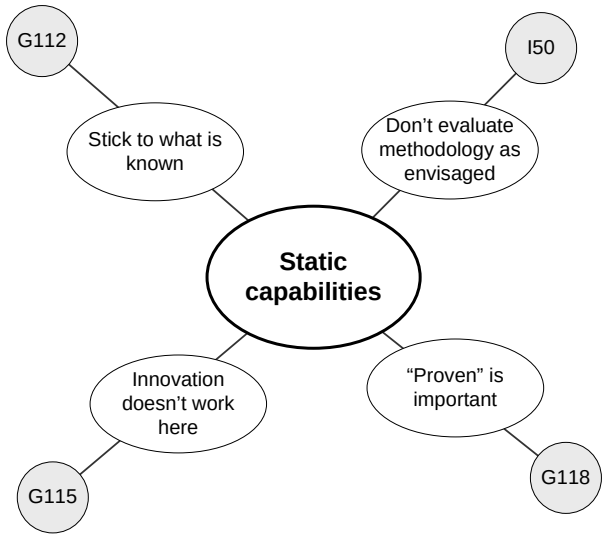

Figure 10.15: Emergence of 'Static capabilities' sub theme

The emergence of Fourier's static capabilities can be attributed to the combined impact of interrelationships 1 to 6 and is represented by connector 7 in Figure 10.16.

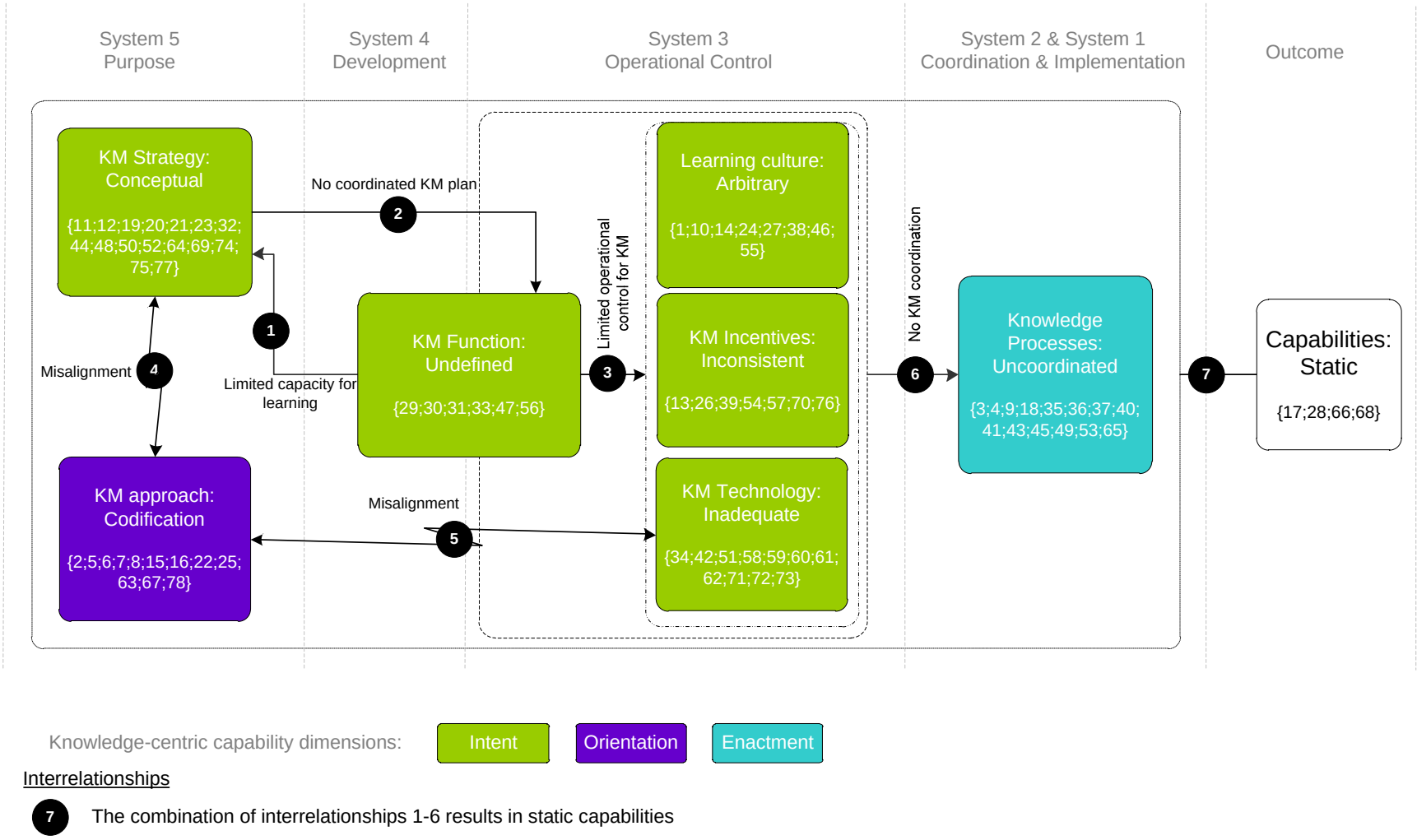

Figure 10.16: Emergence of Fourier's static capabilities

Fourier views its in-house methodology as a key differentiator.

> *"What one needs to do is to differentiate one self, and we do it by means of our methodology; and that's a component of our knowledge management. Actually it is a part of our institutionalised experience – the methodology of how we do things, how we design systems, how we formalise it, how we deliver it. Those are things I think we take to the market with great success and we have a track record for that" (Appendix G:I8).*

The use of this proven methodology is viewed as a significant contributor to Fourier's ability to compete, and the MD explains that employees are expected to innovate within the framework:

> *"Look, the standard processes give one a foundation from which to work, but it isn't cast in stone that THAT is the way one should work. It is not a production process. It is more like a guideline and one would expect the guys to be innovative within that framework" (Appendix G:I50).*

This emphasis on standard processes highlights the focus on knowledge exploitation within Fourier, in other words leveraging existing knowledge in new contexts. As discussed in §3.4 however, organisations that focus solely on knowledge exploitation, will fail to ensure future viability (Levinthal & March, 1993).

Knowledge exploitation typically emerges in activities aimed at improving products, services or efficiency. Fourier's methodology is however seldom reviewed, updated or improved on. The Managing Director explains:

> *"To be honest, as part of our strategic objectives last year we said we must ensure that after each project we must revisit our methodologies. And we did not. Before you know, the project is finished and the guys are working on the third project after that" (Appendix G:I50).*

This shows that Fourier has not developed the capacity to improve the very processes it views as a source of competitive advantage. Conceptually Fourier views the methodologies as a source of competitive advantage, while in practice little is done to ensure it is managed as a dynamic capability. One focus group participant's frustration is best illustrated by the following remark:

> *"How did one guy put it? Stick to your grazing and finish it off". (Appendix G:G112).*

Original quote in Afrikaans:

"*Hoe het een ou gesê? Hou by jou bossie en vreet hom kaal"*.

The lack of action around building a dynamic capability can be attributed to the absence of a coordinated plan for knowledge management (connector 2) and the lack of coordination of knowledge processes (connector 6).

Dynamic capabilities however only emerge if an organisation can simultaneously explore and exploit its knowledge sources and competencies (Easterby-Smith & Prieto, 2008; Levinthal & March, 1993; March, 1991). The exploration of new knowledge in Fourier is however hampered by the lack of operational control of knowledge management (connector 3), which contributes to the arbitrary nature of its learning culture, as well as the organisation's limited capacity for learning as represented by connector 1. Thus, in order to render a sustainable competitive advantage, Fourier needs to find a better balance between its knowledge exploitation and exploration activities.

10.6 Conclusion

The purpose of this chapter was to explain why the Roaming capacity emerged in a specific organisational context. The Fourier Approach case study has shown that a number of interrelationships, summarised in Figure 10.16, play a significant role in the emergence of a Roaming capacity within Fourier's organisational context

Fourier's intent to create a knowledge-centric environment, represented in green, is defined at a conceptual level but not followed through with the structure or function necessary to provide information about the total environment. The lack of context for interpreting the environment limits Fourier's capacity for learning as well as its capacity to formalise a knowledge management strategy that will enable Fourier to align itself to changes in the environment. Fourier's intent to create a knowledge-centric capability is further hampered by the lack of a function that will interpret the conceptual strategy and produce an actionable plan, thus limiting operational control over knowledge management. This is particularly evident in the deficiency of practices that will promote a learning culture, inconsistent deployment of incentives for sharing knowledge, and an inadequate technology infrastructure for managing knowledge.

Fourier's knowledge orientation, represented in purple, is misaligned with its strategic intent and considering the inadequacy of the technological infrastructure, does not have sufficient

operational support. Finally, Fourier's enactment of knowledge processes, represented in turquoise, lacks coordination. This is as a result of the conceptual nature of Fourier's intent to create a knowledge-centric environment.

These interrelationships between the three dimensions of Fourier's knowledge-centric capability thus explain the emergence of the roaming capacity in Fourier's organisational context.

CHAPTER 11
SUMMARY, CONCLUSION AND RECOMMENDATIONS

11.1 Introduction

The purpose of this chapter is to present the conclusions of the study in light of the research questions introduced in §3.5. The chapter begins with an overview of the knowledge-centric view of the organisation, highlighting the shortcomings in the extant literature. The findings for each research question are then presented. The theoretical implications of the research are discussed next, followed by opportunities for further research and limitations of the study. The chapter concludes with a discussion of the significance of the research.

For the purpose of this study a resource was defined as "all assets, capabilities, organisational processes, firm attributes, information and knowledge controlled by the firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991). A capability in turn was defined as "a special type of resource, specifically and organisationally embedded non-transferable firm-specific resource whose purpose is to improve the productivity of the *other* resources processed by the firm" (Makadok, 2001). A capability thus refers to an organisation's capacity to deploy resources using organisational processes to achieve a desired outcome (Amit & Schoemaker, 1993).

11.2 Review of the knowledge-centric view of the organisation

On a global scale knowledge is increasingly being recognised as an important organisational resource. Knowledge management emerged as a discipline as managers started to shift their attention from physical resources to the more intangible, which includes knowledge.

The term knowledge management describes the emerging discipline of the conscious effort to examine and promote the sharing, use and creation of organisational knowledge in a formal manner. As a result of the rapid development of information technology and the internet in the early 1990s, knowledge management was largely driven by consultancy firms in the corporate world. Consequently knowledge management largely developed as a set of technology-driven processes aimed at enabling knowledge creation, sharing and storage. The knowledge management practice and the academic literature developed simultaneously, resulting in the early academic literature following this trend. Without solid disciplinary foundations, knowledge management is often considered a management fad (Foss & Mahnke, 2005).

The knowledge-based view of the firm developed as a new perspective in the field of strategic management, viewing an organisation's knowledge as its most strategic resource. As such, the knowledge-based view is an extension of the resource-based view of the firm, which emerged as a theory to understand why organisations are different (Coff, 2003; Conner & Prahalad, 1996; Curado & Bontis, 2006; De Carolis, 2002; Grant, 1996b; Kogut & Zander, 1992; Spender, 1996b; Von Krogh & Grand, 2002). From the resource-based perspective a collection of internal resources and their application in achieving a sustainable competitive advantage is considered as a suitable differentiating factor of organisations (Barney, 1991; Nelson, 1991; Peteraf, 1993; Wernerfelt, 1984). Despite the significant contribution of the resource-based view to the field of strategic management, a number of criticisms can be levelled against it, the most important probably its rather static view of the organisation.

The dynamic capability view developed in response to this inadequacy, conceptualising the resource-based approach in a dynamic context. The focus of the dynamic capability view is on the ability of an organisation to modify and renew its resource base by creating, integrating, recombining and releasing its resources in order to adapt to a changing environment, or to effect change in the environment (Eisenhardt & Martin, 2000). From this evolutionary perspective of competitive advantage, a sustainable competitive advantage is dependent not only on the ownership of distinctive resources, but also on distinctive and dynamic capabilities (Ambrosini, *et al.*, 2009; Hamel & Heene, 1994; Hogarth, *et al.*, 1991; Kogut & Zander, 1992; Prahalad & Hamel, 1990; Teece & Pisano, 1994; Teece, *et al.*, 1997). The competence of an organisation has been shown to be embedded in its distinct ways of coordinating and integrating activities (Faraj & Sproull, 2000; Garvin, 1998; Iansiti & Clark, 1994). The role of an organisation is therefore to provide an environment that integrates individual effort, activities, learning processes and strategies in a coherent manner.

An important notion of dynamic capabilities is that they emerge from organisational learning (Eisenhardt & Martin, 2000; Teece, *et al.*, 1997; Zollo & Winter, 2002). The resulting organisational knowledge is then absorbed into routines that become the collective organisational memory which guides future behaviour (Levitt & March, 1988). The literature (March, 1991; Marengo, 1994) also highlights the importance of maintaining a balance between the exploration of new possibilities and the exploitation of existing knowledge. Another important aspect of organisational learning in the context of the study is that it is cumulative and path-dependent, implying new capabilities can only be developed on existing

capabilities (Dierickx & Cool, 1989), and that an organisation's current position and path ahead is shaped and constrained by previous learning activities (Teece, *et al.*, 1997).

A final important aspect of dynamic capabilities is that they can exist at different levels in relation to managerial perceptions of the environment, namely incremental, renewing and regenerative dynamic capabilities (Ambrosini, *et al.*, 2009). Incremental dynamic capabilities are concerned with continuously improving the resource base, while renewing dynamic capabilities are concerned with refreshing, adapting and augmenting the resource base. Regenerative dynamic capabilities change the manner by which an organisation changes its resource base, impacting on the current collection of dynamic capabilities (Ambrosini, *et al.*, 2009; Hogarth, *et al.*, 1991).

From a dynamic knowledge-based perspective then, a sustainable competitive advantage cannot only be achieved through the ownership of distinctive knowledge. Additional to a unique knowledge base, distinctive and dynamic capabilities are required to provide an organisational context for creating, sharing and integrating such knowledge. An organisation's knowledge-centric capability is thus defined as the capacity of an organisation to provide an organisational context for creating, transferring and integrating knowledge.

With knowledge management being positioned as a strategic imperative, numerous studies have explored its resource base and its management alternatives. The majority of the resulting knowledge management frameworks however focus on knowledge management best practices while failing to address contextual differences between organisations. This assumed homogeneity constitutes a deficiency in knowledge management research, reflecting a tendency to prescribe a tool, method or way of thinking as far as knowledge management is concerned (Chauvel & Despres, 2002).

Generally knowledge-based frameworks can be grouped into prescriptive and descriptive research. Prescriptive frameworks typically outline a methodology to follow for the implementation of a knowledge management initiative while descriptive frameworks tend to depict particular aspects of knowledge management. A synthesis of the literature shows that most prescriptive frameworks (Gallagher & Hazlett, 2000; Klimko, 2001; Lee, *et al.*, 2001; Levett & Guenov, 2000; Weerdmeester, *et al.*, 2002) follow a life-cycle approach to knowledge management implementation, ignoring differences in organisational contexts. These prescriptive frameworks thus assume that only one path can lead to some ultimate

maturity level in knowledge management, ignoring the dynamic capability concept of path dependency and the concept of equifinality in systems thinking.

Descriptive frameworks (APQC, 1996; Choo, 1998; Holsapple & Joshi, 2002; Leonard-Barton, 1995; Liebowitz, 1999a; Van der Spek & Spijkervet, 1997) tend to focus on knowledge processes, mostly neglecting the organisation's role in creating a suitable environment and context for individuals to create and develop personal knowledge. While some of the descriptive frameworks (APQC, 1996; Holsapple & Joshi, 2002; Leonard-Barton, 1995; Van der Spek & Spijkervet, 1997) identify a number of capabilities required for knowledge management, none of them addresses organisational orientation towards knowledge. These frameworks thus assume that all organisations' orientation towards knowledge is the same, ignoring differences in organisational context. Another important weakness of the descriptive frameworks is that knowledge is mostly viewed as an object that can be stored and manipulated, ignoring the personal and social nature of knowledge.

Furthermore, best practice identification seems to be a goal of the majority of empirical studies in knowledge management (APQC, 2005; Chase, 1997; Choi & Lee, 2003; Darroch, 2003; Davenport, *et al.*, 1998; De Long & Fahey, 2000; Gold, *et al.*, 2001; Holsapple & Joshi, 2000; Khalifa & Liu, 2003; KPMG, 2003; López, *et al.*, 2004; Lucas & Ogilvie, 2006; Martini & Pelligrini, 2005; O'Dell, *et al.*, 1999; Skyrme & Amidon, 1997; Sveiby & Simons, 2002; Viitala, 2004; Wong & Aspinwall, 2005). These studies contribute to develop a better understanding of the components of knowledge management, yet fail to provide insight into contextual differences between organisations and the implications of these differences in terms of formulating an approach to knowledge management. This shortcoming highlights the need for a best-fit or configurational approach to knowledge management.

Bar a few important works, for example Nonaka *et al.* (2008), studies that consider different knowledge-based contexts remain significantly fewer than the number of studies focussing on knowledge-based best practices. Research into knowledge management contexts tend to focus on one or more sub-dimensions of Argote, *et al.*'s (2003) knowledge management context dimension, as presented in Table 11.1.

Table 11.1: Addressing the identified research gaps

Study	Knowledge management context: Units	Relationship	Knowledge	Focus	Gaps	Addressed in this study
Bierly and Chakrabarti (1996) Generic knowledge strategies in the U.S. pharmaceutical industry	X		X	Generic knowledge strategies in U.S. pharmaceutical industry: Explorers, Exploiters, Loners, Innovators.	- Traditional knowledge-based view	- Knowledge-centric view
Birkenshaw, Nobel and Ridderstrale (2002) Knowledge as a contingency variable: Do the characteristics of knowledge predict organization structure?	X	X	X	Characteristics of knowledge in different types of R&D Units: Isolated, Opaque, Integrated, Transparent.	- Suggests optimum organisation structure (contingency approach)	- Configurational approach
Choi and Lee (2002) An empitical investigation of KM styles and their effect on corporate performance	X		X	Knowledge management styles based on prevalent knowledge types: Passive, System-oriented, Human-oriented, Dynamic.	- Neglects interaction between environmental & organisational characteristics.	- Addresses interaction between environment and organisation
Earl (2001) Knowledge management strategies: toward a taxonomy	X			Taxonomy of knowledge management strategies or "schools" for knowledge management:Technocratic, Economic, Behavioural.	- Static view of KM; - Neglects concepts such as interaction with environment, learning and coordination.	- Based on dynamic capabilities view; - Addresses interaction with environment, learning and coordination.
Hansen, Nohria and Tierney (1999) What's you strategy for managing knowledge?	X		X	KM strategies: Codification or Personalisation.	- Only focus on dominance of tacit/explicit knowledge; - Neglects contribution to organisational ability.	- Focus on type, role, boundaries and source of knowledge; - Focus on orgnanisational capability.
Jordan and Jones (1997) Assessing your company's knowledge management style	X		X	Framework for describing dominant knowledge modes within an organisation.	- Fails to explore relationships between constructs.	- Explores relationships between dimensions and sub-dimensions of knoweldge-centric capability.
Martini and Pellegrini (2005) Barriers and levers towards knowledge management configurations	X		X	Knowledge management configurations in Product Innovation: Codified, Network-based, Traditional.	- Only focus on knowledge-sharing capabilities.	- Focus on three dimensions of knowledge-centric capabilty, i.e. Intent, Orientation and Enactment.
	Question 1	Questions 2 & 3	Question 1			

Some studies focus on the properties of a particular unit, for example an organisation, a team or individual within an organisation, or a population of organisations (Bierly & Chakrabarti, 1996; Birkinshaw, *et al.*, 2002; Choi & Lee, 2003; Earl, 2001; Hansen, *et al.*, 1999; Jordan & Jones, 1997; Martini & Pelligrini, 2005). Other studies focus on the relationships between units, in other words how specific dimensions of the relationship impact on knowledge management (Birkinshaw, *et al.*, 2002). Still other studies focus on knowledge properties and how they affect knowledge creation or transfer (Bierly & Daly, 2002; Birkinshaw, *et al.*, 2002; Choi & Lee, 2003; Hansen, *et al.*, 1999; Jordan & Jones, 1997; Martini & Pelligrini, 2005). The synthesis of the context-based studies presented in Table 11.1 highlighted the tendency to ignore the relationship between units, and also to only focus on the distinction between explicit and tacit knowledge while ignoring other characteristics of knowledge such as the role, origin and boundaries of knowledge. None of the studies explore the relationship between knowledge-centric capabilities and knowledge management performance.

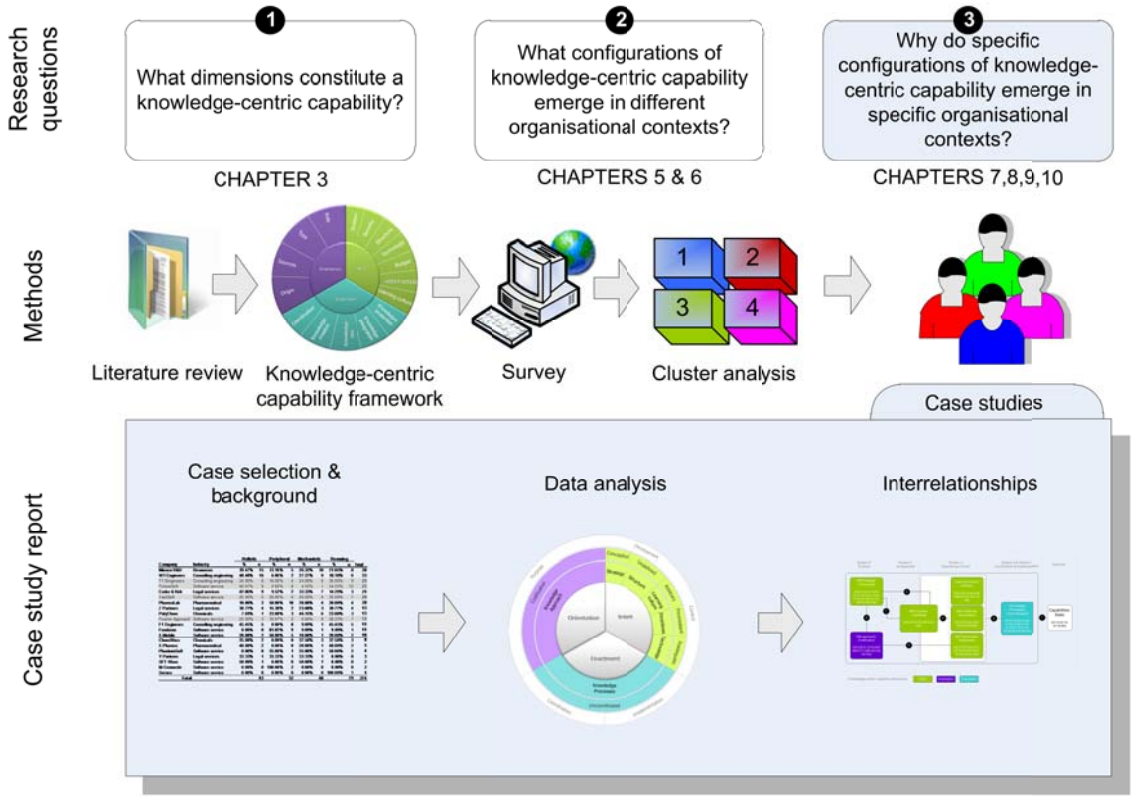

Figure 11.1: From conceptual framework to case study

This research attempted to redress this shortcoming in knowledge management research, and added to the literature by examining how different configurations of knowledge-centric capabilities could be used to differentiate between organisations, as illustrated in Figure 11.1.

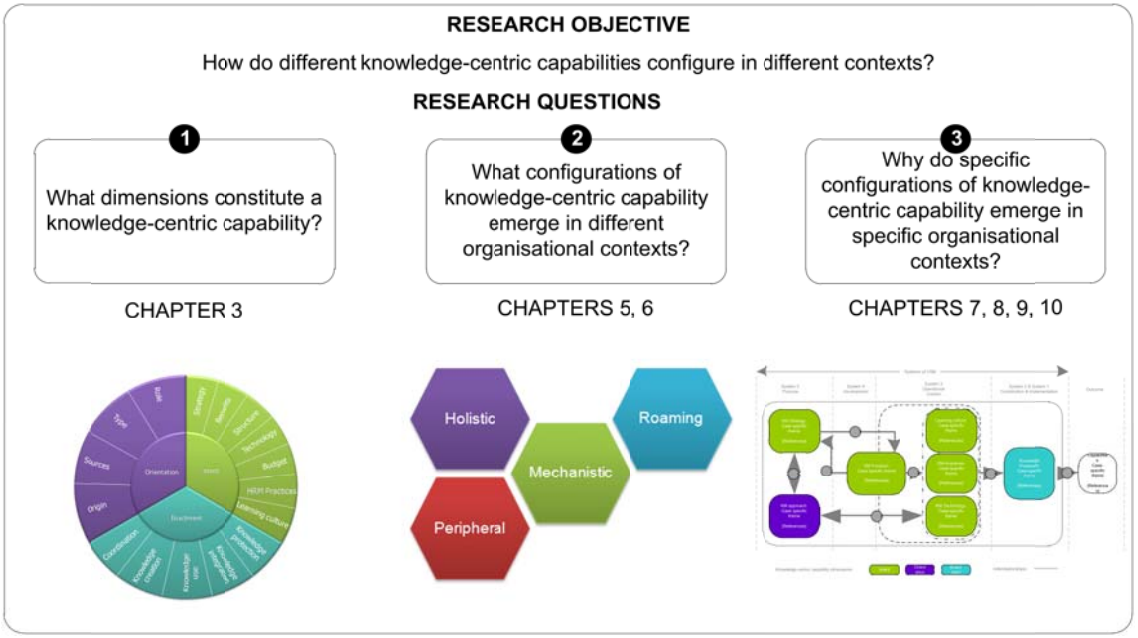

Figure 11.2: Answering the research questions

Three specific research questions were developed from the literature in §3.5. The answers to these questions are summarised in Figure 11.2 and discussed next in §§11.3 to 11.5.

11.3 Summary of findings: Dimensions of a knowledge-centric capability

The first research question related to understanding what dimensions constitute a knowledge-centric capability. In order to answer this question, a definition of the term "knowledge-centric capability" was provided, after which the constituents of a knowledge-centric capability were identified.

Helfat *et al.*'s (2007) definition of dynamic capabilities as "the capacity of an organisation to purposefully create, extend or modify its resource base" was used as the point of departure for the conception of the term "knowledge-centric capability", which is defined as the capacity of an organisation to purposefully provide an organisational context for creating, transferring and integrating knowledge. The term "purposefully" refers to some degree of intent as opposed to routine activities. The first dimension of a knowledge-centric capability thus is organisational intent. Furthermore, an organisation's orientation towards its knowledge resources will have a great bearing on its ability to leverage those resources. Knowledge orientation is thus the second dimension of a knowledge-centric capability. The phrase "creating, transferring and integrating" refers to the actions undertaken by an organisation to modify its knowledge base. The third dimension of a knowledge-centric

capability is therefore the enactment dimension. Finally, the term “capacity” refers to the ability or potential to perform a task adequately and not necessarily to superior performance. It also implies that the capability can reliably be repeated and that it is not merely a once-off activity (Helfat, *et al.*, 2007). Knowledge-centric capability thus refers to the ability to *adequately* provide an organisational context for creating, transferring and integrating knowledge – it does not assume that one type of capability is superior to another. This renders the VSM, discussed in §2.3.3, a suitable framework for establishing the essential structural organisation that is required for the knowledge-centric task to be performed *adequately*.

The three dimensions of a knowledge-centric capability, namely intent, orientation and enactment, were shown to consist of a number of sub-dimensions, as illustrated in Figure 11.3.

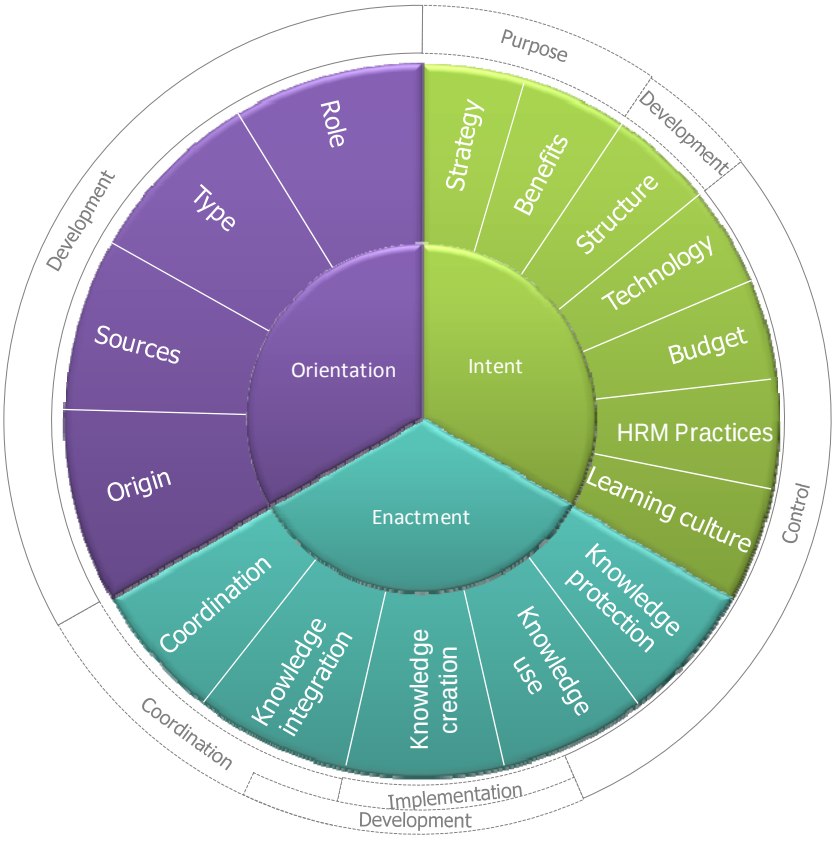

Figure 11.3: Knowledge-centric capability framework

The sub-dimensions were derived from an extensive review of the literature, as presented in §3.6. The intent dimension was shown to consist of seven sub-dimensions pertaining to knowledge management, namely strategy, benefits, structure, technology, budget, human resource management practices and learning culture. The orientation dimension was shown to consist of four sub-dimensions, namely role of knowledge, type of knowledge, sources of knowledge and origin of knowledge. The enactment dimension was shown to consist of five sub-dimensions, namely coordination, knowledge integration, knowledge creation, knowledge use and knowledge protection. It was also shown that the five sub-systems of the VSM, namely purpose, development, control, coordination and implementation, could be mapped to the dimensions of a knowledge-centric capability. Considering a knowledge-centric organisation as an open system, it was argued that the five sub-systems must at least be present for the knowledge-centric capability to be considered potentially adequate.

11.4 Summary of findings: Configurations of knowledge-centric capability

The objective of the second research question was to investigate what configurations of knowledge-centric capabilities emerge in different organisational contexts. The knowledge centric capability framework was used as the theoretical base for a survey that was used to collect the data needed to address the second research question. Investigative questions were formulated for each dimension, after which propositions were identified from the literature that could be used to address the investigative questions. These questions and propositions were presented in Tables 4.2, 4.3 and 4.4. The propositions were then matched with items from existing surveys to enhance reliability and viability of the research questions. Where appropriate matches were found, the existing survey questions were used as is, or adapted to better fit the purpose of the research.

A total of 274 employees from twenty organisations participated in the survey representing a variety of industries, namely biotechnology and pharmaceutical, chemicals, resources, computer, software and related services, consulting engineering and legal services. In order to maximise variability within the answers of organisations, participating organisations could have more than one individual complete the survey. The unit of analysis therefore was the individual, while the level of analysis was the organisation.

In order to identify configurations of knowledge-centric capabilities from the data, a method that complements configurational theory and could define homogenous groups of cases from the data was used. Cluster analysis was used because it permits the inclusion of multiple

variables as sources of configuration definition. The final cluster solution consisted of four clusters. The approach followed with multiple respondents per organisation of course meant that an organisation was likely to emerge in more than one cluster. This outcome could be expected and again highlights the importance of understanding organisational context. Even within an organisation multiple contexts could result in the emergence of different knowledge-centric capabilities, i.e. one team in an organisation could have a different knowledge-centric capability than the rest of the organisation. It is however important to recall that the purpose of the research was not to group organisations into different clusters of knowledge-centric capabilities, but rather to examine what configurations of knowledge-centric capabilities emerged.

In addressing the second research question, namely what configurations of knowledge-centric capabilities emerge in different organisational contexts, the clusters were first defined and then labelled Holistic capacity, Peripheral capacity, Mechanistic capacity and Roaming capacity based on the characteristics on which they were clustered.

The knowledge intent dimension explored an organisation's intent to create a knowledge-centric environment. In this regard there was a clear distinction between the four clusters on all variables, except where the presence of a formal research function was measured. This can probably be explained by the fact that the sample used the Eurostat classification of knowledge-intensive industries, which is based on the percentage of total budget that organisations in various industries spend on research and development. It could thus be expected that organisations included in the sample will have some form of a research function.

In the Intent dimension, the clusters varied most on the variables which indicated whether organisations employed some form of incentive for creating, sharing and using knowledge, and whether knowledge usage was considered in appraisal interviews and salary negotiations. The same pattern emerged in both instances, with the average scores measuring the highest in Cluster 4, followed by Cluster 1, while Cluster 2 measured the lowest in both instances. Most other variables in the Intent dimension also displayed significant variances, with Cluster 1 measuring the highest, Cluster 2 measuring the lowest and Clusters 3 and 4 measuring in between. Four notable exceptions were first that Cluster 1 has a dedicated budget for knowledge management activities, while Clusters 2 and 4 do not have dedicated budgets. Second, Cluster 3 considered the technology used within their organisations supportive of

knowledge management, while this was not the case in Cluster 4. Third, there was a strong view in Cluster 4 that their organisations do not have formal knowledge management strategies, and finally also that they do not have formal knowledge management functions.

The knowledge orientation dimension explored how organisations view knowledge in terms of types of knowledge and the origin, role and sources of knowledge. The most notable difference between the four clusters was with respect to the importance of different types of knowledge to an organisation's ability to compete. Cluster 1 was the only cluster that consistently considered all types of knowledge, i.e. explicit and tacit individual knowledge and explicit and tacit collective knowledge, as significant contributors to their organisations' ability to compete. Another important difference emerged in the role of knowledge in the flow of work, where Cluster 1 was the only cluster to display a high prevalence of both reciprocal and collaborative work, while the other clusters only displayed a high prevalence of reciprocal work. This emphasises the great importance of collective knowledge in Cluster 1, and the need for knowledge coordination mechanisms in all four clusters.

The enactment dimension explored what organisations are doing to create, extend and modify its knowledge base and included coordination, knowledge use, knowledge creation and knowledge integration as sub-dimensions. Cluster 1 consistently performed the enactment activities in the most formal manner, while Cluster 2 generally performed the activities in the least structured manner. A notable exception was the process for creating knowledge about customers, which was rated as a formal process in all four clusters. Only Cluster 1 however, had a formal process in place to convert knowledge about competitors into plans of action. The research has also shown that only Cluster 1 had formal processes in place to use knowledge to improve efficiency. Similarly, only Cluster 1 had formal processes in place to identify best practices, while in Cluster 3 and 4 it was a more unstructured activity. In Cluster 2 it was either an unstructured activity or it did not occur at all.

While Cluster 3 and 4 clustered in a similar manner around variables in the Enactment dimension, a number of notable differences did emerge from the research. Cluster 3 had more formal activities in place than Cluster 4 where sources of knowledge were matched to problems, where knowledge was filtered, where knowledge of business partners were integrated into the organisation, where different sources of knowledge were integrated and where outdated knowledge was being replaced. The research has thus shown that in general, Cluster 3's enactment of knowledge processes are more structured than Cluster 4's, and that

Cluster 1 has the most formal enactment of knowledge processes while Cluster 2 has the least formal enactment of knowledge processes.

The general characteristics of the clusters were used to derive labels that accurately describe each of the four configurations of knowledge-centric capabilities. Cluster 1 was labelled Holistic capacity because of the apparent balance in its approach to knowledge management. Cluster 2 was labelled Peripheral capacity because although certain knowledge management practices were in place, it wasn't the central focus of these organisations and thus did not occur because of a purposeful intent. Cluster 3 was labelled Mechanistic capacity because of the combination of an obvious emphasis of technology supporting knowledge management, and clear lack of human resource management practices such as incentives around knowledge management. Cluster 4 was labelled Roaming capacity because although the importance of knowledge creation and sharing is apparent through the emphasis placed on incentives, the lack of a formal strategy to create a knowledge-centric environment and the lack of a formal knowledge management structure leaves the organisations without direction in terms of how to go about implementing a knowledge-centric environment.

11.5 Summary of findings: Context-specific knowledge-centric capabilities

11.5.1 Background

The third research question related to understanding why specific configurations of knowledge-centric capabilities emerge in specific organisational contexts. In order to address this question, four case studies were conducted at organisations that mainly clustered in one of the four clusters that emerged from the data analysis. The data for the case studies were collected through semi-structured interviews and focus group sessions with employees who completed the survey.

11.5.2 Summary of findings: Holistic capacity

Cedar & Kirk, one of South Africa's largest corporate law firms, emerged as the case study participant to explain the emergence of the Holistic capacity in a specific organisational context. The case analysis has shown that the combination of a number of characteristics has resulted in the emergence of the Holistic capacity in Cedar & Kirk's context.

Although Cedar & Kirk doesn't have a formally documented knowledge management strategy, it is considered part of its broader business strategy, with a conscious decision taken a number of years ago to put processes in place to address the skills gap between previously

disadvantaged candidate attorneys and candidate attorneys with higher levels of education. In this regard, Cedar & Kirk is also leveraging its relationship with its international partner who has a well-established knowledge management programme.

The widespread acknowledgement of the prevalence and value of knowledge management within the firm is also an indication that the direction of knowledge management is clearly articulated within the firm. From a viable system perspective this points to the presence of System 5 – Purpose, which is responsible for the direction of knowledge management within an organisation.

Another characteristic that contributed to the emergence of the Holistic capacity is the formally promoted learning culture that exists within the firm. Cedar & Kirk has a number of initiatives, for example Legal English, monthly case studies, legal update presentations and senior and junior practitioners working together on projects, aimed at creating a culture of learning. Cedar & Kirk's incremental implementation of knowledge management incentives is another factor contributing to the emergence of the Holistic capacity. This approach ties in with Davenport *et al.'s* (1998) argument that motivational approaches should tie in with the general evaluation structure.

Another contributing factor is the facilitative role played by the firm's knowledge management technology. Despite the technology solution in place not being an optimum solution, it plays a significant role in increasing the productivity of junior practitioners who extensively use the knowledge base in the execution of their tasks. The case analysis has also shown that Cedar & Kirk has a formally defined knowledge management structure with knowledge management being the sole responsibility of one of the firm's directors. Case participants also felt that knowledge management fulfils an important role in the firm and that the function will be allocated further resources in the near future. These views indicate that knowledge management is deemed successful in Cedar & Kirk, as growth in knowledge management resources is considered an important indicator of knowledge management success (Davenport, *et al.*, 1998).

The combined knowledge management approach, focussing on both knowledge codification and sharing knowledge through personal interaction, is another important contributor to the emergence of the Holistic capacity. Although multiple channels for knowledge transfer is considered a critical factor for knowledge management success (Davenport, *et al.*, 1998), Cedar & Kirk's combined approach is less common in law firms (Hunter, *et al.*, 2002), giving

them an advantage over law firms focussing only on knowledge codification. Cedar & Kirk further has a number of formal knowledge processes in place, although not necessarily under the banner of knowledge management. Previous research (Skyrme & Amidon, 1997) has shown that systematic organisational processes are key to the success of knowledge management. Cedar & Kirk's emerging knowledge processes enable effective coordination of knowledge management activities within the firm, which are also important to the firm's ability to survive and grow.

The research also highlighted the emergence of dynamic capabilities at Cedar & Kirk, with a lot of emphasis being placed on continuously improving their service offering. In the legal services industry, superior client service is more or less the only way a firm can differentiate itself from its competitors. Cedar & Kirk seems to be fairly successful in this regard, having received close to 40 awards during the past three years, many of which include global first tier rankings. The firm was also named 'Client Focussed Law Firm of the Year – South Africa' during this time period.

From a viable systems perspective, a number of important interrelationships also emerged. The first interrelationship emerged between Cedar & Kirk's knowledge management function and knowledge management as part of the business strategy. The case study has shown that the firm's knowledge management function provides a structure for bringing together knowledge about the firm's external and internal environment, meaning Cedar & Kirk's knowledge management strategy can be adequately informed about and aligned to changes in the environment. This is evident from Cedar & Kirk's realisation that knowledge management can be used to address issues of transformation by developing the skills of previously disadvantaged candidate attorneys and sharing expertise in order to address the skills gap.

The second interrelationship emerged between knowledge management as part of business strategy and the knowledge management function which is responsible for the operational control of knowledge management in the firm. The interrelationship shows that the knowledge management function is interpreting the business strategy in terms of knowledge management and continuously communicating a formally coordinated knowledge management plan to the rest of the firm. The plan consists of a number of initiatives, including the Legal English training programme, a knowledge database containing standard legal documents, monthly case studies and legal update presentations.

The third interrelationship emerged between the knowledge management function and three components of operational control, namely learning culture, incentives and technology. The prevalence of a formally coordinated knowledge management plan is evident in the coordinated processes that are in place to foster a learning culture within the firm, in the incremental implementation of incentives for knowledge creation and sharing and in the use of technology to facilitate knowledge sharing.

The fourth interrelationship emerged as an alignment between Cedar & Kirk's knowledge management strategy and approach. The firm's knowledge management strategy evolved from addressing a skills gap to improving response times and providing good client service. The combination of a codification and interaction approach enables the execution of the strategy with knowledge sharing processes not only addressing the skills gap, but also improving the quality of service rendered to clients. The use of codified knowledge in the form of standard document templates and documented legal opinions in turn improves response times and quality, enabling better client service.

The fifth interrelationship emerged because of the alignment between the firm's combined approach to knowledge management and the operational controls that are in place. Operational controls, such as the Legal English training programme, case studies, legal opinion presentations and mentoring processes are well aligned with the firm's approach to sharing tacit knowledge through interaction and socialisation. The codification approach in turn is supported by technology solutions that provide access to standard document templates and documented legal opinions which are used quite extensively throughout the firm. Furthermore the incentive scheme for knowledge management activities supports both the creation and use of explicit knowledge and the sharing of tacit knowledge. The three components of knowledge management operations thus are well aligned with the combined approach to knowledge management.

The sixth interrelationship emerged between the operational control elements and the firm's emerging knowledge processes. Although a number of knowledge processes are unstructured, the more formal processes are in place as a result of operational elements such as the formally defined knowledge management function, the formally promoted learning culture, the incremental implementation of incentives and technology that facilitates knowledge sharing. Formal knowledge usage processes include the prescribed use of standard document templates and definitions. Formal knowledge integration processes include storing the

standard document templates in the knowledge database, monthly case studies as well as the Legal English training course. The presence of the operational control function in Cedar & Kirk has thus resulted in the emergence of carefully coordinated knowledge processes.

The final interrelationship emerged between Cedar & Kirk's overall knowledge-centric environment and the dynamic capability pertaining to client service that exists within the firm. Previous research (Eisenhardt & Martin, 2000; Teece, *et al.*, 1997; Zollo & Winter, 2002) posits that organisational learning plays an important role in the emergence of dynamic capabilities. The Cedar & Kirk case study supports these findings, with Cedar & Kirk having a formally promoted learning culture and dynamic capabilities emerging in the client service domain.

Viewing the organisation as an open system, all the interrelationships highlighted above correspond to the requisite relationship between the various sub-systems as posited by the Viable Systems Model, meaning Cedar & Kirk's Holistic capacity could be considered potentially adequate.

11.5.3 Summary of findings: Peripheral capacity

Fundamo, the world's largest specialist mobile financial service provider, strongly emerged in the cluster representing the Peripheral capacity and was selected as case study participant to explain the emergence of the Peripheral capacity in a specific organisational context. The case analysis highlighted a number of characteristics which have resulted in the emergence of the Peripheral capacity in Fundamo's context.

Fundamo has an emerging knowledge management strategy. Although the company doesn't have a formal strategy in place yet, the importance of knowledge management is understood in principle. The recent growth of the company has prompted management to start thinking about the role a more formalised approach to knowledge management can play in the future success of the company.

Despite the fact that Fundamo isn't focussing its attention on knowledge management, the company has a number of activities in place that is leading to the emergence of a learning culture within the company. Formal activities include pair-programming structures and financial support for further education. Informal activities include arranging talks by industry experts, so called brown-bag sessions, where employees can arrange lunchtime discussions of their work with fellow employees, and the continuous interaction with a number of large

organisations such as Accenture and S1. The last point corroborates earlier findings (Desouza & Awazu, 2006; Robinson, 1982) that SMEs are particularly skilled at exploiting external sources of knowledge.

Fundamo doesn't have any incentives for creating, sharing or using knowledge, but does view it as a necessary mechanism to change behaviour. The lack of incentives can be linked to the lack of a formal knowledge management strategy and structure. The research has also shown that the nature of Fundamo's operating environment poses a challenge to their need to deploy technology to capture and share knowledge, with the majority of their clients operating in developing countries in Africa and the Middle East where internet infrastructure is often found wanting. As with most SMEs, Fundamo also have resource constraints which pushes formal knowledge management structures to the periphery. The knowledge management structure is undefined and the output, roles and responsibilities regarding knowledge management are not clearly communicated. This in turn results in a lack of integration between business units as far as knowledge activities are concerned.

The research has also shown that Fundamo's approach to knowledge management unwittingly includes both codification and interaction activities. Electronic file structures are used to store and share important documentation while it is foreseen that a wiki will be used as an informal platform for sharing knowledge in future. The strength of Fundamo's knowledge sharing activities, however, is in the sharing and integration of tacit knowledge with interactive activities such as pair programming, brown-bag sessions and working closely with external experts. These activities affords Fundamo the opportunity to create variety in their internal environment which ultimately leads to the emergence of novelty and the creation of new knowledge (Foss & Christensen, 2001).

Fundamo's knowledge processes are however largely unstructured. This can largely be attributed to the fact that while Fundamo was a small company, employees knew who knows what, but now that the company is growing quite rapidly, it has become more difficult. The company has however started to put a skills matrix in place as a knowledge coordination mechanism. The research has shown that knowledge use processes, for example the process to decide which features will be included in a product, is more formal, while knowledge creation processes are largely unstructured.

While a lack of knowledge coordination and informal knowledge processes could inhibit the sustainability of an organisation's ability to build competencies, it doesn't seem to have had a

negative impact on Fundamo. Over the past 10 years the company has developed a dynamic technical innovation capability, being focussed on providing best in class technology and investing around 35% of annual revenues in research and development to ensure it maintains its leadership position.

From a viable systems perspective, a number of important interrelationships emerged between the themes developed in the case study. The lack of a formal knowledge management strategy and a formal knowledge management function resulted in knowledge sharing silos in the organisation, and was identified as the first interrelationship.

The second interrelationship emerged between the undefined knowledge management strategy and the knowledge management function responsible for operational control. The result is an absence of a coordinated plan for knowledge management, which could explain why no standard document naming or versioning conventions were deployed across the various business units.

The third interrelationship was identified between the knowledge management function theme and three themes pertaining to operational control, i.e. learning culture, incentives and technology. In the VSM, System 3 – Operational control, is responsible for interpreting the strategy and communicating a coordinated plan to business units for implementation. In Fundamo the lack of a formal knowledge management function means no formally coordinated plan for knowledge management exists.

The fourth interrelationship was identified between Fundamo's combined approach to knowledge management and the knowledge management strategy theme. Fundamo's knowledge approach, which is balanced between tacit and explicit knowledge, is aligned with its business goal of developing expertise, knowledge and experience.

The fifth interrelationship emerged between Fundamo's combined knowledge approach and the knowledge management technology theme. The knowledge management technology infrastructure currently employed in the company does not adequately support the codification of knowledge, jeopardising the long term success of the codification approach.

The sixth interrelationship was identified between the components of operational control and Fundamo's emerging knowledge processes theme. The fact that all the components of Fundamo's operational control, i.e. learning culture, incentives and technology, are only

starting to emerge as more formalised activities, means that more formally coordinated knowledge processes are also only now starting to emerge.

The final interrelationship was identified between Fundamo's overall knowledge management environment and its dynamic capability pertaining to technical innovation. The interrelationships shows that despite lacking a formal knowledge management strategy, formal knowledge coordination and formal knowledge processes, Fundamo still managed to develop a dynamic capability in technical innovation. This could probably attributed to the fact that as a start-up company, Fundamo initially spent a lot of time creating knowledge by researching concepts, technologies and markets. With the rapid growth of the company, Fundamo is finding it increasingly difficult to share and integrate knowledge in the organisation, which could ultimately erode the dynamic nature of their technical innovation capability. To counter this threat Fundamo needs to formalise knowledge management as a strategic initiative in the company.

It would thus seem that the Peripheral capacity emerged in Fundamo's organisational context because even though knowledge and expertise are central to their success, the company was small enough to explore external knowledge and exploit internal knowledge without having formal knowledge processes in place, i.e. knowledge management was not a core focus in the organisation. Now that the company is going through a phase of rapid growth, however, it has become necessary to put a strategy, processes and structures in place that will enable the company to continue to develop its dynamic technological innovation capability.

11.5.4 Summary of findings: Mechanistic capacity

PolyChem, a leading manufacturer and supplier of thermoplastic compounds in South Africa, emerged as the only case study candidate with a Mechanistic capacity. The PolyChem case study thus was used to explain the emergence of the Mechanistic capacity in a specific organisational context. The case analysis highlighted a number of characteristics which have contributed to the emergence of the Mechanistic capacity in PolyChem's organisational context.

PolyChem doesn't have a formal knowledge management strategy, but views its set of Lotus Notes databases as the core of its knowledge management initiative. The research however has shown that the initiative can better be described as a collaborative information management system, with the Lotus Notes databases clearly targeted at an operational level. The case analysis has also shown a misalignment between the business strategy of developing

expertise and focusing on customer service, and the knowledge management goal of improving decision-making. The misalignment could hamper the success of PolyChem's knowledge management efforts, with previous research (APQC, 2003; Davenport, 1999; Hansen, *et al.*, 1999; Khalifa & Liu, 2003; Liebowitz, 1999b; Skyrme & Amidon, 1997) showing that a knowledge management strategy must be aligned with the business strategy in order to be successful. PolyChem's focus on operations and lack of a formal knowledge management strategy confirms Nunes, *et al.*'s (2006) observation that small and medium enterprises tend to focus on the short term, which could hinder achieving key strategic goals through the current knowledge management initiative.

Apart from occasional formal training activities presented by PolyChem's parent company and mentorship programmes for lower level technicians, PolyChem doesn't have any formally coordinated learning activities, leaving the company with only an arbitrary learning culture. With a business goal of developing expertise, one would however expect to find a set of formally coordinated learning activities geared towards achieving that goal. PolyChem's lack of formally coordinated learning activities based on personal interaction is typical of SME's, as observed in previous studies (O'Regan, *et al.*, 2006; Terziovski, 2010) that found that SMEs do not use an innovation or learning culture in a structured or strategic manner. PolyChem does however have a number of exploitation alliances in the form of the technology licensing agreements with companies such as Dow Southern Africa, EI du Pont de Nemours & Co., Kraton Polymers, Milliken Chemical, Victrex plc. and RTP Company. In order to ensure PolyChem develops firm-specific knowledge that will enable the company to monitor, filter, evaluate and leverage externally generated knowledge, the external exploitation processes should be augmented with internal exploration experiences (Helfat, 1997; Hoang & Rothaermel, 2010).

The unwillingness of some employees at PolyChem to share knowledge highlights the absence of a formally encouraged learning culture and associated incentives. In fact, incentives for knowledge sharing are deemed unnecessary by management, as it is seen as part of a person's day-to-day job. The research has shown however that PolyChem is more focused on what Russell (1996) termed information reporting, which is formal, periodic, structured, mandatory and systematic as opposed to information sharing which is informal, ad hoc, unstructured, voluntary and non-systematic.

The research has also shown that PolyChem's technology infrastructure is more information-centric than knowledge-centric. It does not support typical knowledge management applications such as expert location, social networking or collaborative knowledge creation, but is rather used as a workflow system prompting employees to capture information as part of their daily activities, in other words information reporting.

While Lotus Notes is a valuable enabler in providing communications and interaction mechanisms for effective cooperation, pro-active management is needed to transform an information infrastructure into a knowledge infrastructure (Skyrme & Amidon, 1997). PolyChem's knowledge management function is however largely technology-driven. Other than the Lotus Notes databases, no formal structures are in place to support and encourage knowledge management in PolyChem. The problem with such a technology-oriented structure is that, although the technology provides a structure where information is captured, human interpretation is still necessary to filter and aggregate important information before passing it on to the strategy-making function in the company.

The research has further shown that PolyChem's knowledge management approach exclusively comprises a codification approach, with little insight into what tacit knowledge entails. Changing the approach to knowledge management thus will require a change in the dominant logic of the firm, meaning the way in which managers conceptualise knowledge will also have to change. While PolyChem's main goal with knowledge management is to improve decision making, Haas and Hansen (2007) explains that the main benefit derived from codified knowledge is saving time, and that quality and competence is not improved in the process. The company's codification approach is therefore not aligned with the goal of improving decision-making.

PolyChem's knowledge processes were shown to be workflow-driven. Although knowledge creation and knowledge usage processes are employed as a coordination mechanism for knowledge management, it has a largely mechanistic orientation which tends to ignore how people in organisations actually go about acquiring, sharing and using knowledge.

PolyChem's focus on continuous process improvement, which involves changes to established processes, confirms the findings of previous research (Ambrosini, *et al.*, 2009; Eisenhardt & Martin, 2000) that the resource base of an essentially stable environment such as PolyChem's manufacturing environment, will not be transformed through change, but rather be incrementally adjusted and adapted. Such incremental adjustments could result in

better quality products, lower production costs, product line innovation, and improvement in management practices or better use of materials or information. PolyChem's capabilities can therefore only be described as incremental.

From a viable systems perspective a number of interrelationships emerged between the themes developed in the PolyChem case study. The first interrelationship was identified between the undefined knowledge management strategy theme and PolyChem's technology-driven knowledge management function. In the VSM, System 4 – Development, has to provide a structure for binging together knowledge about the external and internal environment which should form the basis for decision making and strategy formulation (Beer, 1972; Jackson, 2003). Although PolyChem's databases could serve as the structure for capturing all this information, human interpretation is still needed to perform the filtering and aggregating functions. PolyChem's current knowledge management structure does not allow for this. This weakness in PolyChem's System 4 – Development results in the knowledge management initiative becoming overly concerned with operations.

The second interrelationship represents the absence of a formally coordinated knowledge management plan and emerged between the undefined knowledge management strategy and the part of the knowledge management function responsible for operational control. In PolyChem the absence of a formally coordinated knowledge management plan results in a misalignment between the company's business goals of developing expertise and customer focus, and the knowledge management goal of improving decision making.

The third interrelationship, limited control for knowledge management, was identified between the technology-driven knowledge management function and the three components of operational control, i.e. learning culture, incentives and technology. This results in the absence of a formally coordinated knowledge management plan. Very few formally coordinated learning processes aimed at establishing a learning culture are in place. Furthermore, incentives for knowledge management are deemed unnecessary because the knowledge repositories are in fact used for information reporting, and not sharing knowledge in the true sense of the word. A formally coordinated knowledge management plan thus should outline what knowledge is deemed important to the company and how creating or sharing knowledge will be rewarded or how non-participation will be sanctioned. The technology employed by PolyChem is further geared towards reporting information and improving decision-making, even though the business goal is to develop expertise and

customer focus. PolyChem's thus needs to explore ways in which the current technology infrastructure can be aligned with the business goals.

The fourth interrelationship emerged between PolyChem's codification approach and the knowledge management goal of better decision making. Haas and Hansen (2007) explains that the main benefit derived from codified knowledge is saving time, and that quality and competence is not improved in the process. PolyChem's codification approach is therefore not aligned with the goal of improving decision-making.

The fifth interrelationship was identified between PolyChem's codification approach and the company's information-centric knowledge management technology. Being geared towards information reporting, the technology will only support the codification approach as long as the goal is the reporting of information to improve decision making. Without changes to the current knowledge approach and the technology infrastructure, the business goal of developing expertise will not be supported.

The sixth interrelationship, mechanistic coordination, was identified between the components of operational control and the workflow-driven knowledge processes. The mechanistic orientation of the operational control, i.e. over emphasis on use of technology while incentives for knowledge sharing are deemed unnecessary, has resulted in a rather mechanistic approach to knowledge processes, with all knowledge processes being workflow-driven.

The final interrelationship was identified between PolyChem's mechanistic knowledge-centric environment and the incremental capabilities of the company. PolyChem's essentially stable manufacturing environment places an emphasis on continuous improvement, rather than innovation. The resource base will therefore not be transformed through change, but rather be incrementally adjusted and adapted. A transition to more dynamic capabilities will require the use of a more formal knowledge management structure to scan the external environment in a more proactive manner, and the formulation of a formal knowledge management strategy aimed at exploring opportunities in order to reconceptualise the way PolyChem's products are manufactured.

Considering all the findings above, it seems like the Mechanistic capacity emerged in PolyChem's organisational context, because of the huge emphasis placed on using technology to facilitate knowledge management, while at the same time no incentives are in

place to encourage people to create and share knowledge. This approach ignores how people actually go about acquiring, sharing and using knowledge, leaving PolyChem with an information reporting system, as opposed to a knowledge management initiative.

11.5.5 Summary of findings: Roaming capacity

Fourier Approach, an industrial engineering consultation firm, emerged as the best-suited company to explain why the Roaming capacity emerged in a specific organisational context. The case analysis highlighted a number of key issues that contributed to the emergence of the Roaming capacity.

Fourier's knowledge management strategy is pinned at a conceptual level. Agreement exists throughout the company regarding the importance of knowledge management, while the general feeling is that it falls short on execution. This can be attributed to the fact that Fourier does not have a formal knowledge management strategy in place. The lack of direction regarding knowledge management in turn results in a culture of uncertainty about the importance of knowledge management, which tend to have a low priority in the organisation. This finding does however concur with previous research (Nunes, *et al.*, 2006) which showed that small and medium enterprises tend to have a short term focus.

Another area where Fourier lacks direction is in the creation of a learning culture. Formal training is seldom provided and the direction in which knowledge should be developed is seldom communicated, pointing to a lack of "translation" of the purpose of knowledge management within Fourier. Informal learning activities such as discussing work with people in other teams are more prevalent, probably because of Fourier's work environment. Employees work at client sites and seldom have formal contact with colleagues working at another client site. With physical separation deemed a critical barrier to sharing tacit knowledge (Leonard & Sensiper, 2002), the dispersed character of Fourier's work environment poses a challenge to creating opportunities for effective learning activities, particularly for assimilating tacit knowledge.

Fourier aims to use incentives to encourage the creation, sharing and application of organisational knowledge. The company, however, falls short on the execution of the goal highlighted by the emergence of inconsistent implementation practices. Previous research (March & Simon, 1958; Pfeffer, 1997) found that members of an organisation will only continue to volunteer their contributions as long as the incentive for doing so is adequate in

terms of their own personal goals. Inconsistent incentives thus are likely to influence the manner in which knowledge-related activities are performed as well as the priority it receives.

The research showed that Fourier's knowledge management initiative is largely structured around the use of a portal as a central knowledge base. Although Fourier has the technology in place, it is not adequately aligned with Fourier's organisational context. Employees deployed at client sites do not have access to the company portal, rendering the sharing of explicit knowledge via this channel an ineffective exercise.

Fourier also does not have a formally defined knowledge management structure or function, and the output, roles and responsibilities are not clearly communicated. This characteristic is typical of most small organisations where people are expected to fulfil more than one role. Viewing the organisation as an open system, Fourier thus lacks the structure for bringing together knowledge about the external and internal environment, which should form the basis for decision-making and strategy formulation. Previous research (Daft & Weick, 1984; Fiol & Lyles, 1985) have shown that the lack of a context for interpreting the internal and external environments typically results in a limited capacity for learning.

The research showed that Fourier's knowledge management approach only comprises a codification approach, with the aim of developing expertise and improving the quality of service. Previous research (Haas & Hansen, 2007) has however shown that the main benefit derived from codified knowledge is saving time, and that quality and competence is not improved in the process. Fourier's codification approach is therefore not aligned with their strategic intent for knowledge management.

Fourier's knowledge processes are completely uncoordinated. Knowledge creation activities largely constitute capturing information in the portal, but employees are uncertain about precisely what information should be captured. No standard method is used to index documents, resulting in employees not knowing where to find the documents. This approach is in stark contrast with the findings of previous research (Hansen, *et al.*, 1999) which has shown that organisations that follow a codification approach invest heavily in resources to ensure that the codification process runs in a coordinated and efficient manner. This lack of coordination is particularly significant given the distributed nature of Fourier's work environment.

The research also showed that Fourier's capability to modify and renew its knowledge base is static. Fourier views its in-house methodology, which can be viewed as a set of standard processes, as a key differentiator. Fourier however only focuses on exploiting the existing knowledge of the standard processes, in other words leveraging existing knowledge in new contexts. The in-house methodology is seldom reviewed, updated or improved on, showing that Fourier has not developed the capacity to improve the very processes it views as a source of competitive advantage. This finding supports the finding of previous research (Easterby-Smith & Prieto, 2008; Levinthal & March, 1993; March, 1991) that dynamic capabilities can only emerge if an organisation can simultaneously explore and exploit its knowledge sources and competencies.

From a viable systems perspective a number of interrelationships emerged between the themes developed in the Fourier Approach case study. The first interrelationship, a limited capacity for learning, was identified between the conceptual knowledge management strategy and undefined knowledge management function. The absence of System 4 (Development), which is responsible for providing a structure to bring together knowledge about the internal and external environment, means that System 5 (Purpose) does not receive information from System 4 (Development), hampering informed decision making. The lack of a model of the environment it faces further makes it difficult to align the knowledge management strategy with changes in the environment, limiting Fourier's capacity for double-loop learning.

The second interrelationship, absence of a coordinated knowledge management plan, was identified between the conceptual nature of the knowledge management strategy and the part of the knowledge management function responsible for operational control. In a viable system the control function has the responsibility to interpret the strategy and to pass a coordinated plan on to the business units for implementation. In Fourier the absence of a coordinated knowledge management plan leads to a general feeling of being without direction as far as knowledge management is concerned.

The third interrelationship, limited operational control for knowledge management, was identified between the undefined knowledge management function and three components of operational control, i.e. learning culture, incentives and knowledge management technology. The absence of a coordinated knowledge management plan was particularly evident in the three components of operational control. The arbitrary nature of Fourier's learning culture shows that few coordinated processes are in place to assist in establishing a learning culture.

The inconsistent nature of knowledge management incentives in Fourier highlights the lack of a coordinated approach to knowledge management incentives. The inadequacy of the knowledge management technology employed by Fourier further points to the lack of a coordinated plan for using the technology.

The fourth interrelationship was identified between Fourier's conceptual knowledge management strategy and its knowledge codification approach. At a strategic level, Fourier views its in-house methodology as its key differentiator, describing it as institutional experience. The methodology thus represents Fourier's "know-how", its tacit organisational knowledge. Yet, at the same time, Fourier follows a knowledge codification approach, hoping to capture explicit knowledge in a portal. A knowledge approach based in personalisation and interaction will be more appropriate, considering the view taken in this study that knowledge is personal, social and context-specific.

The fifth interrelationship was identified between the knowledge codification approach and the manner in which the knowledge management technology is deployed. Employees struggle to access the portal, highlighting the finding that the technology does not support Fourier's codification approach.

The sixth interrelationship was identified between the limited operational control and uncoordinated knowledge processes that exist in Fourier. The absence of a coordinated knowledge management plan results in uncoordinated and unstructured knowledge processes. The inconsistent use of knowledge in the portal in turn highlights the absence of a knowledge management coordination function. Given the distributed nature of Fourier's work environment, the lack of a knowledge management coordination function is significant.

The final interrelationship was identified between Fourier's knowledge-centric environment and its static capabilities. The company views its in-house methodology as an institutional skill and a key differentiator, yet they don't have a formal knowledge management strategy, structure, plan or processes in place to develop it into a dynamic capability.

It thus seems that the Roaming capacity emerged in Fourier's organisational context because of a general lack of direction regarding the purpose of knowledge management in the firm, as well as a total lack of coordination of knowledge management activities.

11.6 Opportunities for further research

The intention of this research was to develop an understanding of how different knowledge-centric capabilities configure in different organisational contexts. Through the survey and semi-structured interviews diverse data, spread across a wide number of issues, were collected. The findings of this research may be used to add to the body of knowledge by collecting data to provide a platform for testing existing theories, and to enhance the development of new ones.

A cross-case analysis, presented in Table 11.2, has shown that a number of findings of this research support the findings of previous research and also provide opportunities for future research.

Table 11.2: Cross-case analysis

	Holistic capacity	Peripheral capacity	Mechanistic capacity	Roaming capacity
Intent				
KM Strategy	Part of business strategy	Emerging KM strategy	Undefined KM strategy	Conceptual KM strategy
KM Structure	Formally defined KM function	Undefined KM function	Technology-driven KM function	Undefined KM function
Learning Culture	Formally promoted learning culture	Emerging learning culture	Arbitrary learning culture	Arbitrary learning culture
KM Incentives	Incremental incentives	Recognise need for incentives	KM incentives deemed unnecessary	Inconsistent incentives
KM Technology	Technology facilitates KM	Emerging KM technology	Information-centric technology paradigm	Inadequate KM technology
Orientation				
Knowledge approach	Combined approach (codification & interaction)	Combined approach (codification & interaction)	Codification approach	Codification approach
	Exploration & Exploitation	Exploration & Exploitation	Exploitation	Exploitation
Enactment				
Knowledge processes	Emerging knowledge processes	Emerging knowledge processes	Workflow-driven knowledge processes	Uncoordinated knowledge processes
Capability	Dynamic	Dynamic	Inremental	Static
Viability from systems perspective	Essential organisation adequate for long term viability	Essential organisation inadequate for long term viability	Essential organisation inadequate for long term viability	Essential organisation inadequate for long term viability

The themes which provide opportunities for future research are presented below.

Theme 1: A learning culture is important evidence of an organisation's intent to create a knowledge-centric environment.

The case study research has shown that a learning culture was present in the organisations where a knowledge management strategy was either already in place or was emerging, i.e. the Holistic capacity and the Peripheral capacity. On the other hand arbitrary learning cultures emerged in organisations where the knowledge management strategy was either undefined or only existed as a concept, as is the case with the Mechanistic capacity and the Roaming capacity. The extant literature contains a wealth of research regarding various aspects of a

learning culture. Further research about the nature of an organisation's strategic intent to create a knowledge-centric environment and the nature of its learning culture could provide valuable insight into the relationship that exists between the two elements.

Theme 2: A learning culture plays an important role in the emergence of dynamic capabilities.

The findings of this research support the theory (Eisenhardt & Martin, 2000; Teece, *et al*., 1997; Zollo & Winter, 2002) that a learning culture plays an important role in the emergence of dynamic capabilities in an organisation, with both the Holistic capacity and the Peripheral capacity providing evidence of the existence of a dynamic capability.

Theme 3: An organisation's knowledge orientation plays an important role in the emergence of dynamic capabilities.

The case study research highlighted a possible link between an organisation's knowledge orientation and the emergence of dynamic capabilities, specifically the balance between tacit and explicit knowledge, and between exploration of knowledge and exploitation of knowledge. Existing research about organisations' knowledge orientation is currently rather fragmented, generally only focusing on the prevalence of tacit or explicit knowledge, or on the balance between knowledge exploration and knowledge exploitation. Further research about the nature of all the dimensions of a knowledge orientation, i.e. types, role, source and origin, and the emergence of dynamic capabilities could provide valuable insight into the relationship that exists between the two elements.

Themes 2 and 3 provide a further opportunity for future research regarding a possible relationship between an organisation's learning culture and knowledge orientation on the one hand, and the emergence of dynamic capabilities on the other.

Theme 4: Organisational context plays a significant role in the emergence of dynamic capabilities.

The research has shown that organisations in the same industries emerged in different clusters, which signifies that organisational context rather than industry impacted on the emergence or lack of dynamic capabilities. Future research thus could explore the relationship between organisational context and the emergence of dynamic capabilities.

Theme 5: From a systems perspective, the holistic knowledge-centric capacity represents the only adequate essential organisation of sub-systems for long term viability.

The research has shown that while all the configurations contain elements of essential organisation for long term viability as represented by the Viable Systems Model (Beer, 1979, 1994), only the holistic capacity has an adequate organisation of all the essential sub-systems. Through case study research of more organisations, future research could focus on refining the model of interrelationships of the Holistic capacity.

Finally, longitudinal research could also provide valuable insight into how organisations shift between clusters, or how new clusters emerge as their knowledge-centric capability evolves.

11.7 Limitations

Care has been taken to ensure that the research was designed and conducted in a manner to optimise the ability to achieve the objective of the study. There are, however, some limitations that do not invalidate the research, but should be acknowledged.

The research sample included industries based on the percentage of total budget spent on research and development, i.e. medium- and high-technology manufacturing and medium- and high technology knowledge-intensive service industries. Despite industries such as financial services being excluded, this approach still covered a large range of industries, affording the opportunity to explore the effect of industry on knowledge-centric capabilities.

The non-probability sampling technique deployed in the research does not allow for generalisations to be made. Although this could be viewed as a limitation of the study, it would have been inappropriate to attempt to generalise the findings of the study, since the study followed a social constructionist research philosophy viewing organisations as a function of a set of circumstances and individuals.

The number of case studies could also be seen as a limitation of the study, as more case studies could have allowed enriched the description of the four archetypes that were defined. The four case studies that were included have however significantly strengthened the study by moving beyond simply identifying configurations of knowledge-centric capabilities, providing a rich description of each of the four configurations as archetypes.

11.8 Significance of the research

The research makes a significant contribution to the literature in a number of ways, as summarised in Table 11.3.

Previous research has shown that knowledge management as a business practice is largely based on the knowledge-based view of the firm, concentrating on the role of the organisation in knowledge management as that of knowledge creation, while ignoring the importance of organisational context.

Table 11.3: Contribution of research to context-based literature

Identified research gap	Addressed in this study
Ignores context	Context-sensitive
Traditional knowledge-based view	Knowledge-centric view
Static view of knowledge management	Based on dynamic capabilities view
Contingency approach (suggests optimum organisation structure)	Configurational approach
Explicit/tacit view of knowledge	Focus on knowledge orientation (includes knowledge types, boundaries and sources)
Neglects contribution of organisational ability	Focus on organisational capability
Fails to explore relationships between constructs	Explores relationships between dimensions and sub-dimensions of knowledge-centric capability
Focus only on knowledge sharing capabilities	Focus on three dimensions of knowledge-centric capability, i.e. Intent, Orientation and Enactment

This research redressed the shortcoming by postulating that organisational context is important, showing that the role of the organisation rather is to develop a knowledge-centric capability by creating a proper organisational context for facilitating activities and learning at the group level, and knowledge creation and accumulation at the individual level. Where a large number of studies (APQC, 2005; Chase, 1997; Choi & Lee, 2003; Darroch, 2003; Davenport, *et al.*, 1998; De Long & Fahey, 2000; Gold, *et al.*, 2001; Holsapple & Joshi, 2000; Khalifa & Liu, 2003; KPMG, 2003; López, *et al.*, 2004; Lucas & Ogilvie, 2006; Martini & Pelligrini, 2005; O'Dell, *et al.*, 1999; Skyrme & Amidon, 1997; Sveiby & Simons, 2002; Viitala, 2004; Wong & Aspinwall, 2005) in the past have emphasised the importance of best-practices in knowledge management, this study has shown that a best-fit approach to knowledge management is more appropriate when following context-sensitive approach.

Another major contribution of the study is the systematic introduction of the concept of a knowledge-centric capability, which was defined as the ability of an organisation to provide an organisational context for creating, transferring and integrating knowledge. The concept of a knowledge-centric capability was developed from the literature, providing this study with a strong theoretical base. Through the introduction of the knowledge-centric view, the study makes a novel contribution to the knowledge-based view literature.

The study provides a clear link between the definition of a knowledge-centric capability which is based on the definition of a dynamic capability, and the dimensions of a knowledge-centric capability as illustrated in Figure 11.4.

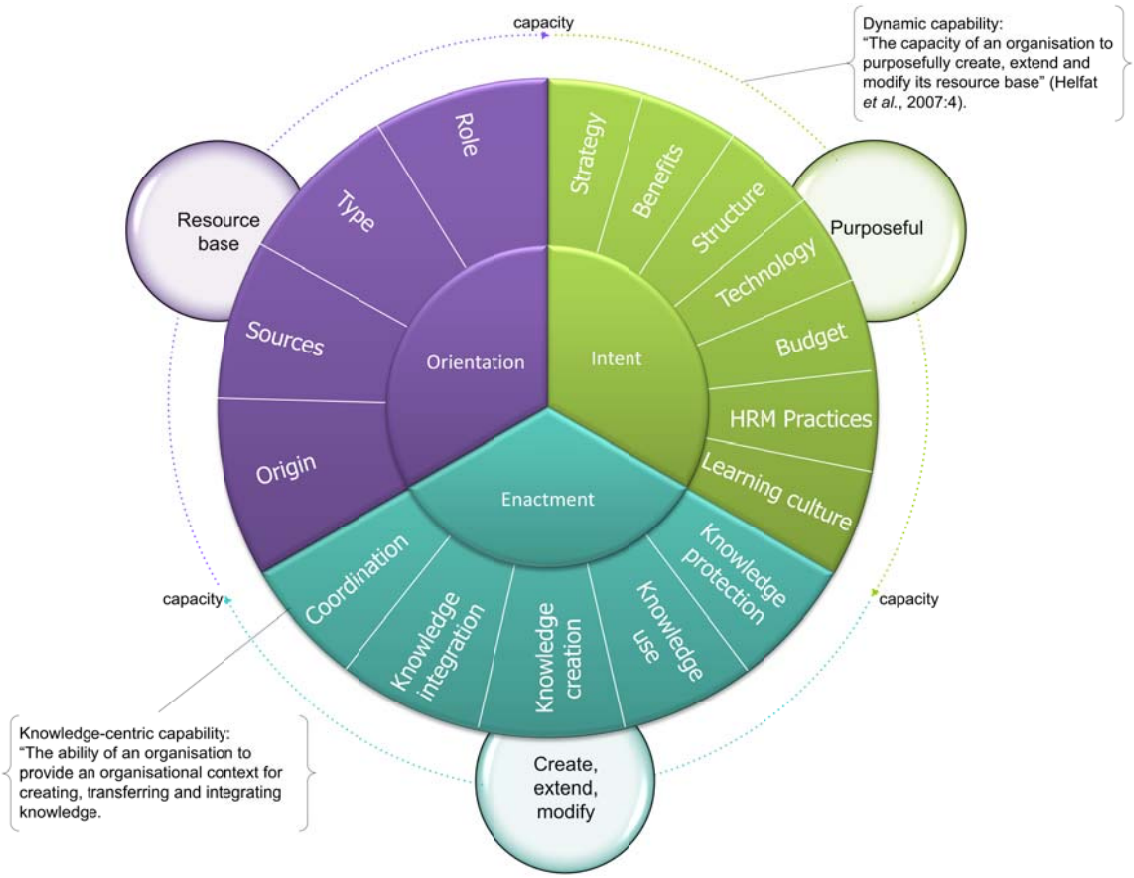

Figure 11.4: Defining a knowledge-centric capability

Prior research (Gallagher & Hazlett, 2000; Klimko, 2001; Lee, *et al.*, 2001; Levett & Guenov, 2000; Weerdmeester, *et al.*, 2002) also often suggests an optimum structure for knowledge management by prescribing a methodology to follow for the implementation of

knowledge management initiatives. Following a configurational approach, this study has identified four configurations of knowledge-centric capabilities, showing that a single knowledge management methodology cannot be applied in all organisational contexts. This contribution also supports the systems principal of equifinality which refers to the notion that open systems have equally valid alternative ways of attaining the same objective from different initial conditions.

Also, where some studies (Hansen, *et al.*, 1999) focus solely on the tacit and explicit characteristics of knowledge, this study explored an organisation's orientation towards knowledge from multiple perspectives, i.e. type, role, origin and source. This approach afforded the opportunity to identify interrelationships between organisational context and a number of sub-dimensions, for example company size and exploitation of external knowledge. Where a number of studies thus fail to explore the relationships between constructs, for example Jordan and Jones (1997), or only focus on a single dimension of knowledge capability, for example Martini and Pelligrini (2005), this study introduced three dimensions of a knowledge-centric capability, namely Intent, Orientation and Enactment and explored the emergence of interrelationships between them.

The identification of four configurations of knowledge-centric capabilities is a major contribution of the research. The concept of a knowledge-centric capability is built on a context-sensitive approach, thus assuming variability. In order to make sense of the variability in knowledge-centric capabilities that exist between organisations, one would look for different types of knowledge-centric capabilities, i.e. the different configurations of knowledge-centric capabilities. The four clusters identified from the survey data are strongly supported statistically. The stability of the results between the two clustering solutions and the specified cluster centres and the interval cluster centres, indicated that true differences exist among organisations in terms of their knowledge-centric capabilities and that the structure depicted in the cluster analysis is supported empirically.

The study did however not conclude with the identification of the four configurations (types) of knowledge-centric capabilities, but went a step further to describe them as archetypes of knowledge-centric capabilities, exploring the conditions under which each of these configurations emerge through a set of four case studies.

Although the purpose of the research was not to generalise the findings to a population, it is worthwhile to highlight a few contributions and the applicability of the case studies findings.

The purpose of the cluster analysis was not to focus on performance. The rich data rendered by the case studies, however, showed that different configurations of knowledge-centric capabilities had different outcomes as far as strategic capabilities are concerned. Combined with the identification of interrelationships based on the Viable Systems Model, the research provides a powerful tool which can be employed to evaluate the potential adequacy of an organisation's knowledge-centric capacity. The Holistic capacity was shown to be the only configuration of knowledge-centric capabilities included in the research with a potentially adequate capacity to remain viable in the long run.

Through the study's unique application of organisational cybernetics to the knowledge-centric capability model, the archetypes thus could serve as a vehicle for design or diagnosis that could tell managers which structures and processes are essential and which can be dispensed with. The archetypes thus could serve as the beginning of pathways to becoming a knowledge-centric organisation, without being prescriptive.

This study has laid the foundation for further research to investigate how an organisation's strategic intent, knowledge orientation and enactment contributes to the organisation's knowledge-centric capability and its long term growth and viability.

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APPENDIX A

SURVEY INVITATION TEMPLATE

USB
Universiteit van Stellenbosch Bestuurskool
University of Stellenbosch Business School

Mr Name & Surname
Job title
Company Name
Company Address

Date

Dear Mr Surname

HOW IMPORTANT IS KNOWLEDGE TO THE SUCCESS OF YOUR BUSINESS?

Your organisation has been identified as a high-technology manufacturing / knowledge-intensive services company that is dependent on knowledge as a strategic resource. How organisations view and manage knowledge is the focus of a research project being conducted by the USB. We would like to invite your organisation to participate in this research. A select number of organisations are participating in the study and you would be able to gain comparative data on knowledge management practices in your industry.

Participating in this research, you will receive a dedicated feedback report which will enable you to gauge best practice and point to areas for development in managing your knowledge base. Since the research focuses on knowledge practices within organisations, best results will be obtained if a select number of people in your organisation could complete an online survey which should take no more than 30 minutes of their time.

The research findings will be treated with the utmost confidentiality. No source, individual or organisations will be identified without the express permission of the originator.

The researcher on this project, Marié Cruywagen, will contact you soon to set up a meeting to discuss the way forward. Marié can be contacted at:

E-mail: marie.cruywagen@usb.ac.za
Mobile: 083 462 0707

We trust that you will cooperate with us in the furthering of science and look forward to your positive response.

Yours sincerely

Professor Wim Gevers
Associate Director: Academic

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APPENDIX B

ONLINE SURVEY

Welcome to the Knowledge Management Survey.

Please read through the following instructions and navigation directions before starting the survey.

- This survey asks for your opinion about your organisation's knowledge orientation and intentions and activities surrounding the use of knowledge as a strategic resource.
- It asks for your judgement, which means **there are no right or wrong answers.**
- Often people are tempted to answer survey questions in the way they think is expected. Please purely respond based on **your own judgement**, regardless of what you think others expect.
- Your responses will be held in strict confidence: your anonymity is guaranteed.
- You can choose to exit this survey and finish later at any time by clicking on the "Finish later" button. The responses you have submitted up to that point will be saved and cannot be edited when you return.
- Resume the survey by clicking on the URL provided in the Invitation e-mail.
- The survey will always be resumed from the first question that must be answered next.
- Click on "Begin Survey" below to begin now.

This study is funded by a scholarship from the National Research Foundation

If you need assistance or have questions while taking this survey, please contact:

Marié Cruywagen
marie.cruywagen@usb.ac.za
083 462 0707

Begin Survey

0 % COMPLETE

Section A evaluates your organisation's current attitude towards managing knowledge.

For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.

---

1. Does your organisation have a formal knowledge management (or similar) strategy?

- o Yes
- o No
- o Don't know

1a. Which of the following items best describe the focus of your organisation's knowledge management strategy?

- ☐ Knowledge is central to our business strategy.
- ☐ Transfer of knowledge and best practices.
- ☐ Management of customer-focused knowledge.
- ☐ Innovation and creation of new knowledge.
- ☐ Other
- ☐ Don't know.

If other, please specify:

■□□□□□□□□□
6 % COMPLETE

Section A evaluates your organisation's current attitude towards managing knowledge.

For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.

---

2. Has your organisation identified areas where managing knowledge can add significant benefits to the organisation?

- o Yes
- o No
- o Don't know

2a. How does the management of knowledge benefit your organisation?

- ☐ Better decision making.
- ☐ Better response times.
- ☐ Increased innovation.
- ☐ Increased profits.
- ☐ Increased market share.
- ☐ Increase productivity.
- ☐ Enhanced employee skills.
- ☐ Reduced cost.
- ☐ Other
- ☐ Don't know

If other, please specify.

Section A evaluates your organisation's current attitude towards managing knowledge. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

---

3. What is the contribution of the following activities to your organisation's current ability to compete?

(Please rate all the statements).

	no contribution	marginal contribution	average contribution	significant contribution	strategic contribution

a. Accessing valuable and scarce knowledge that no one else or only a few organisations have access to.

---

b. Selling valuable and scarce knowledge that no one else or only a few organisations have access to.

---

c. Using proven, inherited or standard processes to manufacture products or deliver services.

---

d. Continuously changing and improving our existing products or services.

---

e. Continuously changing and improving our product development or service delivery processes.

---

f. Continuously inventing new products, services or processes.

Section A evaluates your organisation's current attitude towards managing knowledge. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

---

4. What is the contribution of the following activities to your organisation's current ability to compete?

(Please rate all the statements).

no contribution	marginal contribution	average contribution	significant contribution	strategic contribution

a. Capturing the knowledge of our experts and making it available to all our employees who might need it.

---

b. Providing experiences for employees to build relationships over time.

---

c. Identifying best practices and sharing it within the organisation.

---

d. Providing opportunities for employees to developing new skills.

Section A evaluates your organisation's current attitude towards managing knowledge. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

---

5. What is the contribution of the following types of knowledge to your organisation's current ability to compete?

(Please rate all the statements).

no contribution	marginal contribution	average contribution	significant contribution	strategic contribution

a. Knowledge that remains largely unchanged over time;
(for example universally-accepted principles or principles of physics or chemistry).

---

b. Knowledge that changes infrequently

(for example legislation or accounting practices).

---

c. Knowledge that changes frequently and systematically;

(for example results of annual surveys, marketing research or national census).

---

d. Knowledge that is highly dynamic and changes constantly;

(for example commodity prices or knowledge about new technological developments).

23 % COMPLETE

Section A evaluates your organisation's current attitude towards managing knowledge. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

---

6. How frequently are the following sources of knowledge used by your organisation?

(Please rate all the statements).

never	seldom	occasionally	often	continuously

a. Universities and other public research institutes.

---

b. Private research institutes.

---

c. Management consultancies.

---

d. Industry and professional bodies.

---

e. Specialist literature and events

(for example journals or conferences).

---

f. Database and Internet Searches.

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

---

7. How frequently do the following activities occur in your organisation?

(Please rate all the statements).

never	seldom	occasionally	often	continuously

a. Communicating and explaining organisational goals.

---

b. Indicating the direction in which knowledge should be developed.

---

c. Providing feedback on knowledge initiatives.

---

d. Managers receiving feedback from subordinates.

---

e. Managers learning and developing their own capabilities.

29 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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8. How would you rate the certainty of the outcome of activities within your organisation?

absolutely certain	highly predictable	fairly predictable	somewhat predictable	totally unique

a. In general the outcome of activities within our organisation is:

32 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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9. Please rate the following statements in terms of variability.

(Please rate all the statements).

exactly the same	very similar	variable	highly variable	totally unique

a. In general, the activities, claims, clients or cases we deal with on a daily basis are:

---

b. The methods followed in our organisation for dealing with the different claims, clients or cases are:

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

---

10. How frequently do work and activities flow through your organisation in the following manner?

(Please rate all the statements).

never	seldom	occasionally	often	continuously

a. Work and activities are performed by our employees independently and do not flow between them.

---

b. Work and activities flow between our employees, but only in one direction.

---

c. Work and activities flow between our employees in a reciprocal "back and forth" manner over a period of time.

---

d. Work and activities enter a unit and employees diagnose, problem-solve and collaborate as a group at the same time to deal with the work.

Section B evaluates current activities within your organisation.

For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.

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11. Who does your organisation's dedicated knowledge management group, team or function report to?

- ☐ We don't have a dedicated knowledge management group, team or function.
- ☐ CEO or Managing Director
- ☐ Chief Operations Officer or Operations team
- ☐ Chief Information Officer or IT team
- ☐ Chief Knowledge Officer
- ☐ Steering Committee that provides oversight over knowledge management
- ☐ Other
- ☐ Don't know

If other, please specify

42 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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12. Does your organisation have designated roles within the business units with the responsibility to encourage and enable knowledge sharing and reuse?

- o Yes
- o No
- o Don't know

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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13. Which of the following research departments, groups or teams exist within your organisation?

(Please select all that apply).

- ☐ Research and Development
- ☐ Marketing research
- ☐ Product research
- ☐ Other
- ☐ We do not have any research functions

If other, please specify

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

14. How widely are the following tools used in your organisation?

(Please rate all the statements).

not available	used by few	used by many	used by most	used by everybody

a. Corporate intranet, extranet or portal.

b. Knowledge base, knowledge or best practice repository or document templates.

c. Directory of experts, corporate yellow pages or who's who directories.

d. Corporate search engine or frequently asked questions directory.

e. E-mail.

f. Groupware, document management tools or content management tools.

g. Decision support tools or business intelligence tools.

h. Idea management tools or innovation management tools.

i. Knowledge visualisation, knowledge taxonomy or social network analysis tools.

j. E-learning tools.

52 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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15. The technology used by our organisation:

(Please select the most relevant statement).

- ☐ a. Was specifically designed to support knowledge management.
- ☐ b. Supports knowledge management, but is something which has just grown over time.
- ☐ c. Is a combination of a. and b.
- ☐ d. Is not used to support knowledge management.

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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16. Does your organisation actively monitor the use and effectiveness of the technologies used within the organisation?

- o Yes
- o No
- o Don't know

17. Have managers and employees received training to use these technologies?

- o Yes, everybody
- o Most
- o Only some
- o Nobody
- o Don't know

58 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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18. Does your organisation have dedicated budgets for knowledge management activities?

- o Yes
- o No
- o Don't know

18a. In the next 24 months, do you anticipate the knowledge management activities' share of the overall budget to...?

- o Increase
- o Decrease
- o Stay the same

18b. In the next 24 months, do you anticipate knowledge management activities to have dedicated budgets?

- o Yes
- o No

18c. In the next 24 months, do you anticipate knowledge management activities to have dedicated budgets?

- o Yes
- o No

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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19. Which (if any) of the following mechanisms does your organisation employ to encourage the sharing and usage of knowledge?

(Please select all that apply).

- ☐ Monetary incentives
- ☐ Non-monetary incentives (e.g. seminars or dinners)
- ☐ Official recognition (e.g. reports in corporate magazine)
- ☐ Sanctions imposed on non-users
- ☐ Knowledge usage is considered in appraisal interviews and salary negotiations
- ☐ Other
- ☐ No mechanisms are employed

If other, please specify

68 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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20. Our organisation's performance measurement process:

(Please select the most relevant statement).

- o Measure and reward individual performance above collective performance.
- o Measure and reward collective performance above individual performance.
- o Measure and reward individual and collective performance equally.

71 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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21. How frequently does your organisation:

(Please rate each statement).

never	seldom	occasionally	often	continuously

a. Provide formal training related to knowledge management activities?

---

b. Use formal mentoring practices, including apprenticeships?

---

c. Arrange for experienced employees to interact with new or less experienced employees?

---

d. Offer off-site training to employees to keep their skills current?

---

e. Arrange for employees to participate in project teams with external experts?

---

f. Encourage employees to explore and experiment?

---

g. Encourage employees to ask others for assistance when needed?

---

h. Encourage employees to discuss their work with people in other teams?

74 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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22. How are the following activities performed in your organisation?

(please rate each of the statements).

	Not performed	Unstructured activity	Formal process
a. Applying knowledge learned from mistakes.			
b. Applying knowledge learned from past experiences.			
c. Using knowledge in the development of new products or services.			
d. Using knowledge to solve new problems.			
e. Matching sources of knowledge to problems and challenges.			
f. Using knowledge to improve our efficiency.			
g. Using knowledge to adjust our strategic direction.			
h. Making knowledge accessible to those that need it.			
i. Mapping employee skills and expertise to the organisation's knowledge requirements.			

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

23. How are the following activities performed in your organisation?

(please rate each of the statements).

	Not performed	Unstructured activity	Formal process
a. Acquiring knowledge about our customers.			
b. Generating new insight from existing knowledge.			
c. Acquiring knowledge about our suppliers.			
d. Using feedback from projects to improve subsequent projects.			
e. Distributing knowledge throughout the organisation.			
f. Exchanging knowledge with our business partners.			
g. Acquiring knowledge about new products or services within our industry.			
h. Acquiring knowledge about competitors.			
i. Benchmarking our performance.			
j. Identifying best practices.			
k. Exchanging knowledge between individuals.			

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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24. Briefly describe how new knowledge is typically created in your organisation.

84 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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25. How are the following activities performed in your organisation?

(Please rate each statement).

Not performed	Unstructured activity	Formal process

a. Converting knowledge about our competitors into plans of action.

---

b. Filtering knowledge.

---

c. Transferring organisational knowledge to individuals.

---

d. Absorbing knowledge from individuals into the organisation.

---

e. Absorbing knowledge from business partners into the organisation.

---

f. Integrating different sources and types of knowledge.

---

g. Organising knowledge.

---

h. Replacing outdated knowledge.

---

i. Capturing and sharing frequently used concepts, information and methodologies.

---

j. Sharing stories about organisational successes, failures, and how work is done within the organisation.

---

k. Capturing and sharing terminology commonly used within the organisation.

87 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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26. Briefly describe what your organisation does to ensure that knowledge is dispersed throughout the organisation.

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

---

27. How are the following activities performed in your organisation?

(Please rate all the statements).

	Not performed	Unstructured activity	Formal process
a. Protecting knowledge from inappropriate use inside and outside of the organisation.			
b. Protecting knowledge from theft from within and from outside the organisation.			
c. Incentivising and encouraging the protection of knowledge.			
d. Restricting access to some sources of knowledge.			
e. Communicating the importance of protecting knowledge.			

93 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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28. Over the past two years, how has your organisation's abilities to perform the following activities evolved?

(Please rate each statement).

	deteriorated	deteriorated slightly	remained unchanged	improved	significantly improved
a. Inventing new products or services.					
b. Identifying new business opportunities.					
c. Coordinating the development efforts of different units.					
d. Anticipating potential market opportunities for new products or services.					
e. Commercialising innovations.					
f. Adapting to changes in the organisation's external environment.					
g. Anticipating surprises and crisis.					
h. Decreasing market response times.					
i. Avoiding overlap in the development of organisational initiatives.					
j. Streamlining our internal processes.					

97 % COMPLETE

Section B evaluates current activities within your organisation. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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29. Briefly describe what your organisation does to recognise or anticipate the need to change.

100 % COMPLETE

Section C covers the final two questions of the survey. *For the purpose of this survey, think of knowledge as facts, information, know-how, expertise, experience and insight.*

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30. Would you like to make any general comments?

What is your position within the organisation?

- o Executive
- o Managerial
- o Other

If other, please specify:

You have completed the survey. Thank you for your time and valuable input!

If in future you would like to read more about this survey or Knowledge Management in general, you are welcome to visit incontexte.com, or click on the button below to go there now.

Regards,
Marié Cruywagen

End Survey

APPENDIX C
CASE STUDY PROTOCOL

A. Introduction to case study

- The purpose of the case study is to understand why a company closely matched the profile of one of the clusters that emerged from the cluster analysis.
- The case study questions were compiled using the responses to the theory-driven survey as a point of departure.
- The role of the case study protocol is to provide a standardised agenda for the case study interviews and focus group sessions, in order to ensure the reliability of the case.

B. Data collection plan

- Fourier Approach (Centurion)
  18 February 2008 15:00: Interview with MD
  16:00: Focus Group Session
- Cedar & Kirk (Sandton)
  19 February 2008 11:30: Interview with Director of Knowledge Management
  13:00: Focus Group Session
  21 February 2008 13:00: Cape Town Focus Group Session
- PolyChem (Cape Town)
  26 February 2008 11:00: Interview with Knowledge Management Manager
  12:00: Focus Group Session
- Fundamo (Cape Town)
  27 February 2008 09:00: Interview with Chief of Operations
  10:00 Focus Group Session

C. Outline of case study report

- Case background
- Data analysis
- Discussion of themes and interrelationships

D. Case study questions

- Level 1 questions, asked of interviewees, are categorised under the following headings:
  - Strategy and benefits
  - Structure
  - Technology
  - Budget
  - HRM practices
  - Learning culture
  - Knowledge types
  - Knowledge sources
  - Knowledge role
  - Coordination
  - Knowledge use
  - Knowledge creation
  - Knowledge integration
- Level 2 questions, asked of the individual case:
  - Provide an overview of the company and their knowledge management status
  - How do the themes that emerged map to the knowledge centric capability framework?
  - How do the themes that emerged map to the viable systems model?
  - How does the context of the company explain the emergence of the specific configuration of knowledge-centric capability?

APPENDIX D

CEDAR & KIRK TRANSCRIPTIONS

Interview with Director of Knowledge Management

Ref.	Speaker	Content
I.1	MC	First of all just a few more background questions. The number of employees at Cedar & Kirk?
I.2	DKM	I never know this answer. I would say in terms of employees, in terms of lawyers or total?
I.3	MC	In total.
I.4	DKM	I would say we're probably round about 200.
I.5	MC	And then when we look at the legal services industry, in terms of the drivers of change, how would you describe those? What are the things that you need to look out for?
I.6	DKM	In the legal industry? Well obviously we are highly dependent on information that is particular to the legal environment. For instance any legislative changes would be critical, and that's on a daily basis that those change. Case law, so you know decisions that are being handed down by the court, once again on a daily basis. So keeping up to date with what those are. So those would be the two primary ones. Changes to legislation would include changes to regulations.
I.7	MC	Are there any regulations of government that have a direct impact on law firms as such?
I.8	DKM	The only legislation that really impacts on us, but more on our day-today running and in terms of our clients is FICA, the Financial Intelligence Centre Act. Other than that they've tended to leave attorneys alone. I mean there obviously is for example the Attorneys Act which regulates how you do your articles for two years, we just deal with the law society, once you've done that, you fall under the regulations of the law society as opposed to government itself.
I.9	MC	And in terms of charters, do you have any BEE charters?
I.10	DKM	There's a draft out for the legal services industry, and the law society is sort of running with that. So we really take our guidance from the law society and they in turn look at the legislation and how it applies to law firms.
I.11	MC	And if you then look at your firm, what are the critical contributors to the success of Cedar & Kirk. What are the things that you need to do different as opposed to other law firms?
I.12	DKM	Well, I would say probably the key thing is the service we give to clients. So the more clients you have, or the sooner one's able to provide them with what they need, obviously it's more profitable for the firm, which is really the success of the firm. So its attracting the right calibre of client - the ones that can afford you, so that's really key, and the only way you attract those clients and keep them is if you provide them with a service that they don't get from other law firms. At the end of the day we all provide the same services, you know, so you could go to any law firm and you will probably get the same advice at the end of the day. It's just how you deliver that advice, how do you do the brief.
I.13	MC	Now if we move on to the survey. The survey indicated that you have a formal knowledge management strategy. Why did Cedar & Kirk decide to implement a knowledge management strategy? If you could give me some background on that?
I.14	DKM	It must have been about 6 years ago, we started looking at the sort of strategy of the firm as a whole, and what we needed to take into account, obviously transformation and one of the issues was knowledge management. And we felt that, you know at that stage I don't think anyone have heard of the term knowledge management, but the firm really recognised that it was important that we start looking at ways of capturing knowledge, sharing knowledge, and make provisions within the firm. So we started off, and I think it probably actually came about through ... we have an association with a firm called DLA, we're now sort of one of their approved firms. And they are very proactive on knowledge management, and have been for a very long time. They've got a department of about 40, 50 people, knowledge management alone. They are in the UK, and then they acquired an American firm, so they sort of got 3000 offices around the world. So they are very big. And I think it's through them really that we've got to learn about knowledge management. So we started off with one of the senior directors who were nearing his retirement. They asked him if he would start our knowledge management. So that is really how we started. The difficulty we realised though that we've had, was after about two years of him doing this, was that it was very difficult for him having his own practice with clients, and then do knowledge management on the side, to actually get anywhere. So we found that it was going slowly and it was about four years ago that they've identified that they actually needed to have a dedicated person for knowledge management.
I.15	MC	And your strategy, is it documented in some way, or how is it communicated to the firm?
I.16	DKM	No, and that's probably one of the things we are looking at working on. Is actually putting a knowledge management strategy document in place. We don't have one in writing at the moment. At the moment knowledge management is really just part of the strategy of the firm. I think it was initially conveyed to everybody, about four years ago. But since then the focus has really been on more the transformation issues, growing the firm, black economic empowerment, so the focus the past three years have really shifted, and that's what's being conveyed to management and staff, rather than knowledge management.
I.17	MC	The survey results indicated that there are different opinions about the focus of the knowledge management strategy. You indicated that knowledge is central to your business strategy. Why is it incorporated in your business strategy?
I.18	DKM	Well, we believe that, the fact is if you've got all these lawyers sitting in this building and in Cape Town, and everyone has this incredible amount of knowledge, and unless it's actually shared, and I suppose it came about probably when we were looking at transformation at the same time and we recognised there was a need; you know a lot of the transformation candidates haven't necessarily been at university; and haven't had the level of training that some of the university candidates have had; and we found there was a big gap between, you

		know, if I can be ... call it as it is, the whites coming in and then the black students who haven't had the benefit of sort of the level of education in the past, so I suppose our main aim with bringing knowledge management in initially was to try and address that gap; and you know try and up skill those who didn't have the skills, and try to transfer the knowledge from those that have it to the ones that don't. So in fact our knowledge management actually is at the point now where when the appointed partner started, he actually started with a training programme which we call Legal English, through which we try to train them how to draft in Legal English, and draft legal documents, and from there he then started to draft standard documents and so we slowly started pushing ahead.
I.19	MC	Why do you think there were different opinions about the focus of the knowledge management strategy? Some for example, the majority said it was central to the business strategy, some said the main focus is knowledge transfer, and then a few said it is customer-focused knowledge. What do you think are the reasons for that?
I.20	DKM	I think probably because we haven't communicated anything about the focus. They all know that knowledge management exists in Cedar & Kirk...to be honest, they see sort of me as knowledge management and they see sort of more what I do and then assume that's all knowledge management. And it's also been, you only have one person doing it, whereas if you had a bigger department and you interact with the lawyers more often, they would have a better understanding of it. So, and it is going slowly, I'll be honest, it's probable not going as quickly as we'd like, but we only have one person doing it, and doing all the components that is lumped under knowledge management it does go slowly, we are looking at, I'm hoping, we sort of have the IT systems to back that up, so we're now going onto a new intranet that will allow the knowledge management part of the Intranet to be developed. They keep telling me it will be any day now, so I'm hoping; so at least once that's actually launched, the knowledge management database on the Intranet, I'm hoping that more people will be aware of exactly what is knowledge management.
I.21	MC	The benefits that you expect from knowledge management. Three benefits stood out: better response times, enhanced employee skills and increased productivity. Why are those three important to you?
I.22	DKM	Well, I think key is quicker turnaround time. Obviously, the sooner you can generate the document that your client wants and give it to them, the happier your client is going to be, so our view is if we can have a database of documents that have been created, that are up to date and current, that users can access, they'll be able to turn that document around for the client a lot faster, than having to almost redraft the document when they were working with something outdated; and I suppose quicker response times means increased productivity when you are able to do more work than when you have to redraft old documents, and also we include in knowledge management things like training, and legal updates, and that sort of thing, so hopefully at all times we try to identify changes and to make employees aware of them.
I.23	MC	You've indicated that you do have a formal knowledge management function and everybody knows about it. Is this function depicted in your current organogram?
I.24	DKM	It is once again probably something that is shared with all of the directors, and not perhaps necessarily with the more junior attorneys. We've sort of gone through a process of setting up heads of departments where we didn't have formal structures in the past. We have a new HR person who looks at all the HR issues, and now knowledge management is shown on that organogram as falling under one of the departments. I think they do struggle with where knowledge management fits in. And in fact we're looking at the moment at performance reviews to put plans in place, for an effective review process to take place, at the end of our financial year, and they just don't know what to do with knowledge management, and what objectives they should set, or what the key performance indicators in areas should be.
I.25	MC	The survey results also indicated that you do have designated roles within business units to encourage knowledge sharing and use. Could you explain a bit more about the reasons behind that?
I.26	DKM	Well, in addition to the more formal structure in terms of procedures we have in place and standard documents and that sort of thing, we also felt that it was really important for there to be forums where the sort of more experienced professionals are able to share their experiences or pass comments in the presence of the junior professionals and they can ask questions and there can be a formal debate and share knowledge that way; so that's why we have monthly case studies where we identify certain decisions by the courts in different practice areas, so the commercial department will have one, the litigation department will have one, credit law will have one, competition law will have one, where we meet once a month and we consider three recent cases, and then we usually ask the juniors to prepare questions and hopefully to encourage some discussion and then we also have legal update presentations where if a new area of law is, you know say for example the national credit act, we get a number of presentations by some professionals on that, and encourage them to ask questions and debate and hopefully you get to share experiences; I mean you would like to expand it eventually you have some smaller groups discussing actual transactions, ones where you know there is interest in, for example we've been involved in the attempted takeover of Harmony by Goldfields, and you know to discuss the actual legal issues that arose there and that's at least one way for the juniors actually to learn a bit more about these areas. And in fact that's probably more effective than just giving them a manual to read on their own.
I.27	MC	That's interesting. You also indicated that the technology tools that are used in the company support knowledge management. Can you explain a bit about what tools you are using and why?
I.28	DKM	Ja, they probably support it, they probably don't, you know, advance it that much. At the moment we're working with a really simple system. Our database of knowledge management sit in Word and it can basically be accessed by anyone. We have now developed this new intranet which we hopefully will launch by the end of the month. We will then have everyone to access knowledge management rather through this intranet and it will actually bring all of the different components together so for example, the librarians have various IT systems they have access to, for example Sabinet or whatever system it is; but they all sit in different places in the firm and we try to bring it into one central place so that everyone, a lot don't know what is where, can use it. So, they do support it, but not necessarily as I say advance it. We are starting getting there; we are now looking at document assembly and information systems.
I.29	MC	The intranet, is that totally new or is it a current system that's being updated?
I.30	DKM	We had an old intranet, but Johannesburg had one and Cape Town had a separate one, so it was never one for the firm. In the past the two offices were treated fairly separately, and as

		from the beginning of last year we sort of brought the whole company together, under one system, so we all are now on the same intranet; and the difficulty I had at least with knowledge management then was that they didn't have automatic access to the knowledge management database, so I had to save it on to a disk set, send it to Cape Town, they had to load it there, and we were working with slightly different systems in terms of IT, so you weren't sure if the documents looked the same down there as it looked here, so at least now we are standardising it.
I.31	MC	In terms of budget, you indicated that you have a dedicated budget for knowledge management in the company.
I.32	DKM	Ja, I'm not sure how dedicated, the budgeting process has always been a bit vague, but certainly the focus has been more in the past year on having formal budgets in place; So in terms of knowledge management we're quite lucky in that the only thing we budget for in knowledge management is my salary, and then the library has a separate budget even though it does fall under knowledge management they count it as a separate budget, the library budget is something we've never done in the past, this year has almost been, we've thumb sucked a number for the library budget and then we'll have a more formal budget in place for the next monetary year. And then the IT systems fall under the IT budget, so there isn't sort of a central knowledge management budget as such, but they fall under different components. There is a training budget.
I.33	MC	We now look at incentives within the company. You indicated that knowledge usage is considered during appraisal interviews and salary negotiations. How does that work and why was that implemented?
I.34	DKM	Again, we're sort of at quite an interesting point in Cedar & Kirk's whole strategy at the moment. In the past it's always been in terms of performance reviews and remuneration has always been considered by a remuneration committee; and it's always been stressed though that, particularly to the other fee earners, that it's not only their fees that they earns, it's also the other contribution they make to the firm; so for instance a lot of the other directors sit on review committees in terms of they review the standard documents, where they give comments and feedback and that is recognised as contributions to the firm's knowledge base and then they are supposedly recognised for that. This was in an informal way. So now they've actually formalised that process and in terms of the current performance plans, there are specific key points indicated and of those there are ones of adding to the firm's knowledge base, assisting in the creation of knowledge.
I.35	MC	I just want to get back to another question on the budget. You indicated that you anticipate that the budget will stay the same over the next 24 months.
I.36	DKM	Yes, I think the structure will stay the same at the moment. You know I suppose the difficulty with any of these initiatives is the issue of cost at the end of the day. They have now, when one looks at the library forming part of knowledge management, they have now added two new librarians in Cape Town, at quite an increased cost to the firm. But Cape Town specifically needed that. But I don't foresee the budget increasing over the next 24 months.
I.37	MC	Now we can go back to the incentives section. Some of the other participants indicated that some other incentives that are used include non-monetary incentives and official recognition which included articles and reports. Why do you think some respondents indicated these mechanisms are also used?
I.38	DKM	Some of the respondents are directors, so they would, at the moment the performance plans are only in place for directors, it's being filtered down to the other levels, but it isn't there yet, it will only be there by June. So I don't think they're aware yet that this will be a specific component of their performance review. So in the past, and that's probably what their current view is, their reward for contributing to knowledge for instance is that they will, you know if they write articles for instance and they get published, they're recognised for that publication. And I suppose they also see it when they work really hard, they are rewarded by being sent to a seminar, or something like that. So we do try to sort of recognise, it's usually more at a departmental level rather than centrally. It doesn't fall under the knowledge management strategy, but it is being recognised.
I.39	MC	Next we look at the learning culture within the company. The survey distinguished between informal and formal activities. Informal activities are focused on encouragement and include encouraging employees to explore and experiment, to ask others for assistance when needed, and to discuss their work with people in other teams. Formal activities include using formal mentoring practices, including apprenticeships; arranging for employees to interact with new or less experienced employees; offer off-site training to employees to keep their skills current; arranging for employees to participate in project teams with external experts. Now in your company the informal and formal activities rated as equally prevalent. Why are both the informal and formally managed activities important?
I.40	DKM	On the formal side we do try to encourage our professional employees in particular, to keep them updated in specific fields, to go and attend seminars on the latest developments, to undertake further study if they want to do their Masters or whatever; so a lot of them do outside studying in terms of studying towards a Masters or a relevant course from a university; and we send a lot of people on seminars. They however usually identify the ones they want to go on, and then ask if they can go on them. Sometimes though we do, mostly the training material gets sent to me, so I will see this is important and forward it to the relevant department to see if they want to send somebody to the seminar and whether they have the budget for it or not. So that would be on the more formal side. And I suppose on the more formal side would be included things like our case studies and internal presentations where we hear the professionals' view on new developments in law. And then on the sort of less formal side certainly we are, in terms of the way our structure works, we have you know directors and then allocated to them are junior professionals. So they'll have associates working for them, candidate attorneys working for them, and certainly part of their expected performance is that they actually train these people and provide them with experience, to gain experience in that field. So they are each spending a lot of time training them and should be open for them to go and ask them any question. We did look at putting a sort of mentoring system in place, and it probably still is on the cards, but it's a very informal one where a few more of the juniors were responsible for other juniors. They felt they were more likely to freely share their views and stuff with someone that wasn't necessarily one of the senior people. But certainly we've got both and the idea is that you should be able to go and knock on a door and ask anybody for help, even in a different department.
I.41	MC	The next couple of questions look specifically at the company's view of knowledge. In the survey you indicated that both explicit and tacit knowledge are significant contributors to your organisation's ability to compete. Included were capturing knowledge of experts and making it accessible to employees who need it; providing experiences for employees to build relationships over time; identifying best practices and sharing it within the organisation; providing opportunities for employees to develop new skills. So when you look at the current

		occurrence of these activities in your company, why are these types of knowledge and activities significant contributors to your firm's ability to compete?
I.42	DKM	Ja, I think it is key that, our ability to compete is actually based on how well you can service your client. And you can only service them very well if you have the knowledge available to you. You don't need to know everything, but you should know where to find it, and have the ability to go and look for it or you go and ask somebody. So there is more formal information that is available to them, if they want standard documents or if they need access to legislation or case law then we have all of the IT, we access the external databases that give us access to that; but also important is the more tacit and trying to get that knowledge out of a person's head or their experience with regards to a particular legal matter and sharing that with others. And often people go on a particular matter and get an opinion from for example a senior counsel, and usually that just lie in their file, so what we're trying now to do is to make sure we do get that opinion from them, creating a database of any opinions, so even if it's someone who write an opinion on a tax structures for instance, or competition law or we get a counsel opinion or another law firm who happened to have got an opinion that they've given through to their client who happen to be on the other side of our client, and trying to capture all of that, obviously the more knowledge we have available, for our professionals, the better service they are able to provide to the client.
I.43	MC	Just out of interest, whose responsibility is it to capture all that?
I.44	DKM	It is mine. So basically what I have to do is, I actually send the e-mails out on a regular basis, usually once a month I send an e-mail saying please if you have got any opinions or an arbitration award, it might be, they might have drafted a very interesting case of argument for a matter where there is a very useful summary of their position, obviously some people ignore the e-mail, and others send you what they do have. What I also do is I actually get, usually on a two-weekly basis, our accounts department sends me all of the invoices that they've received from counsel, and then I just flip through them, and try to see if there is anything out of those where they've drafted an opinion and then from that I then e-mail the person concerned and say we've received an account from counsel for an opinion, please can I have it. And then you get it in the database, so, but again people are slowly getting used to the idea that that's what they're supposed to do. We also do have departmental meetings once a month, where every department asks the relevant professionals if they've got anything that they could add. It is going slowly, but at least the message is getting through to them.
I.45	MC	When we look at the nature of the work, the survey indicated that the outcome of activities within your organisation is fairly predictable. Why would say that? What contributes to it being fairly predictable?
I.46	DKM	I suppose my view would be generally what you're doing is you take instructions from a client, you do your work with them, you give them a product. And that process never really changes. Obviously the outcome of what you're giving might be different. It's not really predictable whether you're going to win the matter that you're on if you're in the litigation department. If you're in the commercial department your instruction is to draft an agreement, and you send out an agreement. So that's why it's fairly predictable. And there is variety in terms of what you're doing on a daily basis. One day you might be drafting an agreement, the next day, if you're in the commercial department, you might be giving an opinion, or you might be reviewing someone else's agreement, you might be spending the whole day in meetings, but at the end of the day, what you need to deliver to the client is fairly predictable.
I.47	MC	That starts to address the next question. The activities your company deals with on a daily basis are variable.
I.48	DKM	Certainly in the litigation department, one day you might be drafting a settling agreement, you might be in court.
I.49	MC	Similar to that, in terms of the methods used in your organisation, it was indicated as being very similar. In other words, when I do an activity today, and I do the same activity the following day, I will use a similar method. Why is that the case?
I.50	DKM	I suppose it's the nature of what we do. If you are predominantly drafting an agreement, you would follow the same methodology. You would take an instruction from the client, you would go and find a standard document that you would use to draft that agreement; you would draft it. Obviously the facts and opinion to that document would differ, but the methodology would be the same, and then you would get the product out. If you would do research, for instance, for a client, again I think your methodology would be the same, and you would go and look at the various research products that are available, the legislation, the textbooks, case law, ja, I would say the same methodology is followed.
I.51	MC	The reasons for those questions are to understand to what degree new knowledge is required for people to do their work on a daily basis.
I.52	DKM	Ja, I would say, in terms of new knowledge you get different nuances on similar type matters from time to time, and it's quite interesting to catch-up with what those are and sharing it with people so that when they come across it they understand how to deal with it. And then we directly deal with legislation, so as soon as legislation changes, for example the National Credit Act created havoc, because suddenly you need to change the way in which you advise clients for instance on for example if you look at employee loans, whether they do they charge interest or don't they, and if they do, do they fall under the National Credit Act, and if you draft agreements, does it form part of the Credit Act, and if it does, you actually have to change the document completely. So those were things where it was very important for us to capture the new knowledge initially, and then try to share that with everybody as soon as possible.
I.53	MC	Just out of interest, who looks out for changes in the legislation?
I.54	DKM	I look at the new legislation, but generally a lot of the directors are in any event monitoring it as well. So as soon as something as big as the Credit Act comes up, almost immediately the body of directors say, well whose going to be responsible for up skilling themselves in this? And then they'll depart that knowledge to the rest of the firm.
I.55	MC	When you look at knowledge sources, the survey indicated that work in your organisation is occasionally completed in a collaborative manner, and sometimes in a reciprocal 'back-and-forth' manner. Why are there instances where sometimes work flow between employees but only in one direction, and sometimes work are performed independently with no flow.
I.56	DKM	I would say it's probably more common actually, because every attorney in the firm has their own practice as such, and they really run it on their own. You're never really aware of what anybody is doing in their particular area unless it's actually shared. We do from a financial management perspective we monitor files that have been opened and we have departmental practice management we look at every month which files have been opened by which fee earners. But more, not to understand what work they're doing in terms of the actual legal content, but do they have enough work, or don't they; are there someone who should be getting more work who are not as busy as they should be. But other than that,

		everyone really does take their own instructions, does the work, send the product out, bill the client and we might never know what they're working on, unless they discuss it. We are trying though to, there certainly has been a view, from especially a lot of the younger juniors that they would like to work in teams. I suppose it comes from their desire to get that knowledge from the senior people. Whereas unless you're actually working for that person, you don't ever get to know about it. Whereas if you work in a team, and he then shares that knowledge ... so we are looking at trying to build up sort of a team system. It's a fundamental change from the way it's been done in the past. It's quite interesting. We did a transformation survey in the firm about a year or so ago. Just to get a view of what, you know we had a strategy out there that all the directors were aware of, but no one else were aware of, and we just wanted to get an understanding of what our employees actually believe and felt about the company. So we did this survey, and it was actually very interesting that it was mainly the woman and the black people that felt a team structure would be better, because they felt that the white men sort of tended to hog the good work, and that it could be more beneficial for us to work in teams and thereby share the knowledge and expertise with everyone in that team. So that was very interesting what actually came out.
I.57	MC	And then in terms of the role that knowledge play within the firm, the results indicated that improving existing services and processes are significant contributors to your organisation's ability to compete. The other options were having access to unique knowledge that no one else has access to; selling unique knowledge; and innovation or creating new knowledge. So in your company improving existing services and processes were rated as significant. Why are those important to your firm's ability to compete?
I.58	DKM	Our perception of that would be obviously improving, I think everyone in the firm believe in that, improving our service to our clients, which is sort of something we strive to do every day. It is the only way that you are actually going to keep your client. It's fairly a competitive market out there, other law firms trying to poach clients all the time. So one needs to make sure those clients you have stay with you and are happy. So I think everything really in the firm is directed at, predominantly directed at our clients, and obviously we are looking at our people and our broader community. So certainly we aim to improve out services. And obviously if your processes improve internally you are able to be more productive and efficient in servicing your clients.
I.59	MC	Just out of interest again, the big Corporates etc. do they review their legal service providers...
I.60	DKM	Yes, especially the banks. They actually have, and somebody like Eskom, they have panels of attorneys which, so you actually have to almost tender to sit on their panel. And they become quite, sort of, not demanding, but they expect, you actually have to go in and say what rates you're going to offer them, what other benefits you could offer them, say for example training, and they are always looking for sort of value-add above purely legal advice. So, but having said that, you obviously want to be on the panel, because you cannot get the work without being on the panel. Once you're on the panel, it actually often comes down to relationship. And who is involved, and what is their relationship with each other. You can also be on the panel and get no work, but generally if you're on the panel, it's about the relationship.
I.61	MC	The final four questions are focussing on processes within Cedar & Kirk. The first one is the coordination of knowledge-related activities which included: [List items Q 17].The results indicated that most of the activities are largely unstructured, with some formal processes in place. The formal ones are 'matching sources of knowledge to problems and challenges'; and 'mapping employee skills and expertise to the organisation's knowledge requirements'. Why do you think this is the case?
I.62	DKM	I think the others are pretty much informal. Certainly in terms of communicating to our employees, it's not been one of our strong points in the past. It certainly is something that we need to address and we need to communicate to employees and tell them where we're going to get their buy-in into the process. The ones that are more formal are the things that we can do now a lot easier than the others. The others we still not know how to deal with. Also because we had the two separate offices there hasn't been one centralised way of organising it. It has been a bit disorganised in terms of I didn't even know how Cape Town were doing it. I'd send them the disk, but I wouldn't know...but the new Intranet would be a help.
I.63	MC	And then, in terms of the usage of knowledge, how it's applied, the survey indicated that the activities are largely unstructured. Those included: [list all Q18]. Why would you say is it more unstructured?
I.64	DKM	I think it depends. For instance, one of the things we really do is obviously standard documents which got all the latest knowledge in them. Now those would be used fairly often. They are standard documents which are used to work on. However, other aspects of knowledge would be used more, sort of not so formally, so it depends on the type of work you've been asked to do. If someone is working on a trial, we actually have no idea how they use the knowledge. They'll obviously use more of their own knowledge, than the knowledge that is within the firm. I suppose because we are predominantly a commercial firm, our commercial department is probably the biggest of the departments, it certainly is the focus of the firm, is the commercial department and commercial work, so that's really been our focus from a knowledge management perspective at this stage. It certainly is recognised though that it would certainly be worthwhile, at some stage, to try to get the knowledge from the litigation department, and centralising that.
I.65	MC	And then if we look at knowledge creation which looks at the following processes: [list items, Q19]. These processes also were rated as being more unstructured than formal.
I.66	DKM	Ja, it's actually interesting listing to you read that list, because I think you know we've always viewed knowledge management at Cedar & Kirk as being sort of professional knowledge. Knowledge of the law. Whereas listening to that list, it's actually quite interesting to note that knowledge management should actually encompass knowledge of clients, what your competitors are doing in terms of their business' strategies towards clients and that sort of thing. It's probably somewhat differently in Cedar & Kirk in that we have a, I know at departmental meetings for instance we actually, they discuss for example do you know of competitors leaving the places where they've been working, moving to different firms, new clients, that sort of thing, so it's almost housed somewhat differently. We also have people who monitor for example all the tenders that get published, and then we actually go and research in terms of that particular company, but it's done through a different department than knowledge management. The librarian in Cape Town, she does a lot of that where, you're targeting a new client, and then she does a lot of research to actually find out information about that company, and present it to the person who goes to target that client. So it does get done probably more informally, and there's not a formal structure for it. And then also added to that, there's always been a need, a lot of people especially don't know in the firm, who does what necessarily, so, everyone knows who's in which department, but you don't know that someone has for example specialist knowledge on insolvency or specialist knowledge on for example divorces. We're trying now to build up a database that we call who know who, and, so it's who in the firm has done specialist work in what field, and then also to build

		up a database of knowing outside expertise. If you want to find attorneys in Zambia or somewhere, has anyone dealt with someone that they could recommend? Which in the past has been completely informal and you'd send an e-mail and ask does anyone know of somebody or has anyone dealt with this.
I.67	MC	And the final question looks at knowledge integration. How knowledge is dispersed throughout the organisation. Some activities rated as unstructured, while the majority of the activities rated as formal processes. The unstructured ones were absorbing knowledge from individuals into the organisation; absorbing knowledge: [list items Q20 red]. Those were unstructured. And then formal processes included: [list items Q20 green].
I.68	DKM	Ja, I'd say it's probably right, because we've got formal structures in place in terms of, we have for example databases in place with standard documents, standard definitions; we have some formal structures where the case studies are presented; we do have more informal where people chat in the corridor to get expertise on a certain matter; or discussions over lunch; But we'd like to try and capture that informal knowledge better. We now also have a formal training programme for our candidate attorneys in place, which I sort of administer and I put in place, so every year I arrange the sessions and then I give the training in the beginning of the year which is more about how things work at Cedar & Kirk; so how do you open a file; how do you bill time; that sort of thing. And then at the moment they have their training on Legal English, so one of our senior partners who's quite particular about the way things should be drafted actually sit with them for three separate sessions and he actually gets them to stand up and dictate something and he corrects them or explain how he'd rather describe it, and then they have four training programmes through the year on different legal topics. So drafting a view for instance, what are the things you should consider, what are the things that are standard, and explain why certain things are in a document or aren't in a document. So that's the third year we've had that programme.

Focus Group Session

Ref .	Speaker	Content
G.1	MC	The survey results indicated that Cedar & Kirk has a formal knowledge management strategy. What I would like to know from you is why do you think the company has a formal KM strategy, and how do you know about that strategy?
G.2	Chris	Shall I start? I was involved in the executive committee of the firm that sort of took the decision initially when we tried to build up our KM capability. I think we realised that we've always had a precedent database of documents that can be used for clients. That obviously used to speed up our processes on this side but also gave certain consistency and with the research we did and the initial documents we didn't need to re-invent the wheel each time. But that was really all we did. We did nothing else other than that precedent base. I think we realised though that we needed to expand that quite considerably, to service all the areas in the firm. Because we were predominantly servicing only our Commercial department and we needed to service the other departments as well for a start. And secondly, ja, not just to have precedents but to have other forms of knowledge that were available, we realised that we had a whole pool of knowledge here that was not accessible to everybody. Certain people had things in their heads, or even on their computers, but nobody else new about that. There was no way of sharing that and we realised that it was quite a valuable resource and that it was just going completely to waste unless we had some shared basis of sharing that knowledge. I think we also saw what our competitors were doing, particularly abroad in other countries. We have a link-up with an English firm XXX and they have extensive knowledge management. A lot of professionals are involved full-time in KM and I think that following their lead we tried to do something ourselves. We initially had one partner who agreed he would devote I think half his time or whatever, a certain percentage of his time to KM. That just didn't work and eventually he just got suck back into deal work and we've now got DKM in Joburg who's actually given up all her clients, all her legal work, and it suited her for other reasons, but she just does knowledge management now.
G.3	Chris	Marié you're asking the why question. I think for the reason to share knowledge; and it enables you to service your clients so much better; it also from a risk point of view I think it minimises our risk because we know that we have put a lot of research into a document initially and where we used it to compile a contract to the client's needs in future, we've done the research, we can rely on that document, particularly if we have more junior staff members working on things, they can then use the documents, they don't have to go find it out themselves and possibly leave things out that were important, so from that point of view, you know from the risk management point of view it is quite an important tool.
G.4	MC	And any of the others. How do you know about the strategy? How do you know it exists?
G.5	Serge	It was brought to our attention fairly early in our careers. A lot of our work is precedent-based, like Chris* said. So the first step you do when you're going to draft an agreement is find the precedent within the system, if one exists. We constantly try to update the system. Because there are some things that slip through the gaps.
G.6	Erin	It's part of our orientation programme at the beginning of the year when you've just arrived. You'll spend two weeks learning all about the database, how you access it, how you change things.
G.7	Chris	How change it? You can't change it. [laughter].

G.8	Erin	Change the wording. Chris* Okay. [laughter].
G.9	MC	Then, in terms of the focus of the KM strategy, most of you indicated that knowledge is central to the business strategy. Why would you say that's the focus?
G.10	Chris	I suppose most professional firms in terms of disciplines I suppose knowledge is important. We spend a lot of time advising people and to be able to go and advise people on the law, you need to do some research and wouldn't do the research over and over again.
G.11	Erin	Ja, you do a lot of ... for businesses for example, so you do a lot of repetition; different circumstances but the same thing. So doing all the ground work once and then you have the knowledge.
G.12	MC	Would you say that this is fairly embedded in the way you do things?
G.13	Chris	It has been and it's sort of becoming more over the last five years probably.
G.14	MC	In terms of the benefits expected from KM, you indicated three options: (1) better response times, (2) enhance employee skills and (3) increase productivity. Why are those three important to the Cedar & Kirk?
G.15	Erin	Time is money.
G.16	Chris	If you can get two agreements out the same time your competitor gets one agreement out, you make twice the amount of money and you also impress the client.
G.17	MC	In terms of KM structure, you all indicated you do have a formal KM function. Why do you say a formal KM function exists?
G.18	Erin	I think apart from the physical database on the system, we also know that there's this person, DKM in Joburg, who is responsible for it.
G.19	Serge	She's constantly managing it and driving it.
G.20	MC	In terms of the areas where you work, do you have designated roles; people that actively encourage people to share knowledge or to use the knowledge base?
G.21	Chris	We probably don't [others say n-o-o]. We have teams of people are involved in processing pieces and doing the KM work as part of a team, but I don't think there's anybody who actually actively follows up at a departmental level to see whether it's rolled out there.
G.22	MC	And then in terms of technology, the survey results indicated that the technology tools used by the company support KM. Can you give an example of why you say the technology supports KM?
G.23	Chris	It's all computer-based, and a database that can be accessed by anybody. At the moment we just trying to put our Johannesburg and Cape Town databases together, that will be, hopefully within the next month, but the databases are replicated in both regions. And everybody has access to those on the Intranet. There's obviously also a lot of software tools that we use and we're investigating some search-engine type software to be able to, for instance having a database of opinions that we get from third parties, we get those in hard copy we don't have them on our system in Word and we need a way to search those. We're investigating software to do that.
G.24	MC	And on a daily-basis? Do you actually use the database in your daily work?
G.25	Erin	On an hourly-basis. [laughter]
G.26	Serge	Ja. [laughter].
G.27	MC	We now move on to budget. You've indicated that there is a dedicated budget for knowledge management activities. Why did you say there is a dedicated budget?
G.28	Serge	I assumed that because we have one person appointed to do this particular job that there would be some sort of plan.
G.29	Chris	Well, you have a partner who's been generating income before that's now taken out and no longer generates income directly, and that costs you money.
G.30	MC	And it seems it's known throughout the organisation that DKM is responsible for KM.
G.31	Chris	Oh ja.
G.32	Serge	Ja.
G.33	Chris	She does video training every now and then and comes done here every now and then as well.
G.34	Serge	That form part of technology and goes back to the previous question where she does sort of inter-firm ...
G.35	Chris	Ja well it's part of the video, we have lectures and that sort of stuff...
G.36	Erin	She does a lot of the training for the candidate attorneys, so they all know her.
G.37	MC	And why do you anticipate that the budget will remain the same or increase over the next 24 months?
G.38	Erin	I think since I started here, which is two and a bit years ago, it's already started to become a bigger function. So I do think it will increase.
G.39	Serge	Ja, I certainly hope so, that it will increase over time. It's one of our critical things.
G.40	Chris	It's going to have to as well. We're planning to increase the size of the firm as well over a fairly short period of time, so we'll need to probably enhance the ability to drive this.
G.41	MC	Then, if we look at incentives. The survey indicated that the firm uses incentives to encourage the sharing and use of knowledge. And some specific items that were highlighted included non-monetary incentives, e.g. seminars or dinners, official recognition, for example articles or reports in corporate magazines or journals, and then knowledge usage is considered in appraisal interviews and salary negotiations. Can you give an example of why you selected any of those?
G.42	Erin	I think the article one is pretty obvious.

G.43	MC	Why do you say that?
G.44	Chris	Well it's part of your KPA...
G.45	Serge	It's part of our training as Candidate Attorneys. You write a lot of articles.
G.46	Erin	For journals.
G.47	Serge	Ja, for journals, as well as for our clients.
G.48	MC	And it terms of appraisal interviews? Do you have measures in place that measure other knowledge management activities?
G.49	Serge	We know what the KPA's are. But we haven't had our official profit KPA's yet. [laughter].
G.50	Chris	Certainly writing articles will be a KPA for you guys. We also have something called house style where documents have to look a certain way and stuff gets done in a certain way. For you and other guys house style will also be taken into account as part of your performance appraisal. No one really polices that although everybody knows who doesn't conform. It's just one of those things. Some people are better at it than others. It is at least in theory an aspect that we take into account.
G.51	MC	If we look at the learning culture in the company, there are informal activities, which focus on encouragement, and then there are formal activities which are more a managed activity. The informal activities include [list items]. And the formal activities include [list items]. Both informal and formal activities rated as equally prevalent in the organisation. Could you give an example of why you said these activities are prevalent?
G.52	Erin	The formal ones would be like the teleconferences that you have on a weekly basis during your first year here at Cedar & Kirk. So it would be a formal mixture of presenting, asking questions, it is structured.
G.53	Serge	And we have a one monthly case study thing where we evaluate the newest developments by looking at cases. That's in each department as well. But it's the same as the formal telecon.
G.54	Chris	Ja, the other ones are a little bit... first it's about educating people that we do try to work in teams here; we have a senior practitioner and more junior people working together on projects, on the bigger projects and I guess that's a way of parting knowledge too.
G.55	Serge	And that's more formal anyway.
G.56	Chris	Ja, it's kind of part of a mentoring process that takes place. It's the way we work.
G.57	MC	Are people in general quite keen on asking somebody else for assistance? Or would you say people are a bit reluctant?
G.58	Chris	I think you regularly see e-mails going out saying we have done XYZ before, how do I do this?
G.59	Serge	Ja
G.60	Erin	Ja;
G.61	MC	Next we look at Orientation. So that's how the company views knowledge. Explicit knowledge include information, any knowledge that you can express or capture in a database or a document, or that resides in a book or a journal article. Tacit knowledge include skills, experience and know-how - knowledge that people have in their heads, that they can't really express that easily. From the survey both these types of knowledge rated as significant contributors to the organisation's ability to compete. Why would you say things like capturing the knowledge of experts, providing experiences for employees to build relationships over time, identifying best practices, and providing opportunities to develop new skills. Why are these important to the firm?
G.62	Chris	A lot of our work revolves around giving advice to other people, so you base that advice on either your experience or something that you go and research and look up yourself. And if somebody else has looked it up before or given another opinion or if somebody external has given you an opinion, some people will qualify it themselves, you'll certainly make use of it.
G.63	Serge	And if it's all in the same system, it's easy to access that stuff, so the two does flow from each other.
G.64	MC	The outcome of activities, in other words the work that you do on a daily basis, you indicated that the outcome is fairly predictable. As opposed to being highly uncertain or 100% certain.
G.65	Erin	I think we said it's fairly predictable because, I mean the law changes but not every day. The circumstances of clients differ, so it cannot be 100% predictable, but there are predictable bits.
G.66	MC	In terms of the type of work that you do on a daily basis, is there a lot of variability?
G.67	Chris	Speaking for myself, I do commercial work, you deal with different clients, but essentially it's the same. Advising clients on corporate matters, company law matters, drafting agreements for clients, you'll have this type of agreement or that type of agreement. But essentially it's the same sort of work. So again, everybody's circumstances are different, but the type of work you're going to be doing each day is fairly uniform. And that is why you can apply the knowledge that you have pretty much to any type of job you do, you can rely on your previous knowledge. It's not that you have to learn new stuff each time you do a job.
G.68	MC	And in terms of the methods used to do your job?
G.69	Chris	Also very uniform.
G.70	MC	And then in terms of how work flows within the company. Whether it's done by individuals independently, sometimes work flows between individuals, but only in one direction; sometimes it happens in a back-and-forth manner, or it happens in a more collaborative manner?
G.71	Chris	It's probably a combination of those.
G.72	Erin	But generally it flows down. Because you have a senior partner maybe that will have more than one junior that he can use.
G.73	Chris	But it does flow back as well.

G.74	Erin	No, I mean ..
G.75	Chris	I will check it with you to see what you've done.
G.76	MC	When we look at the role knowledge plays within the organisation, you indicated that improving existing services and processes are significant contributors to your firm's ability to compete. Why are those important contributors?
G.77	Chris	We don't do different things all the time, so that's why. We pretty much do the same kind of work from one week to the next, so what we really need to do is improve the way we do that work. When you're doing different work you have to adapt. But all we do is improving the way maybe we are doing the things that we do.
G.78	MC	And also touching on that, what is it that you think Cedar & Kirk needs to do particularly well as opposed to your competitors, to distinguish you from your competitors?
G.79	Chris	I think speed is quite , for me in anyway, a lot of law firms at our level will produce fairly good legal work, I mean the clients are entitled to expect that. One firm is not going to give a radically better product that another, so the speed at which you work, the personal relationships you have with your clients, those are the kind of things that probably will distinguish you.
G.80	MC	When we look at how knowledge management is coordinated, a number of activities rated as largely unstructured in the company. Whilst matching sources of knowledge to problems and challenges; and mapping employee skills and expertise to knowledge requirements, rated as formal processes. Can you give examples of why you said that?
G.81	Erin	I think on the first one we said it is structured because we put it in the database, but it's not structured because of the work we get in from clients. So you get an instruction, you maybe do the research and get the knowledge, and then that is there in the database. But if you didn't get that instruction, you wouldn't have done the research and got that as general knowledge.
G.82	MC	So are you saying that the instructions you get from clients more or less dictates what knowledge you should develop?
G.83	Serge	Sometimes ja. When you do get specific or unique instructions.
G.84	Erin	You might need it again in future, but it's developed because you need it now.
G.85	MC	And do you know what should go into the database? Or does everything you do go into the database?
G.86	Chris	On the Commercial side I suppose we know what kind of transactions we deal with the most, so those are obviously the ones that we put in there. And once those are in, I think we now got to the stage where we're also dealing with slightly more unusual things and are starting to work on those. But 80% of your work is there.
G.87	Serge	And also the changes in the law, we must update our opinions and we had a recent flurry of new fairly very important legislation so the documents need to be updated fairly regularly.
G.88	Chris	DKM does report and she got this schedule of what she's doing, but I don't know if that filters down to everybody though, because, and in fact we haven't seen anything for a while. But at management level we do get updated on what she's been doing, what her plans are for the next month or two and what documents she's been working on. So there is a, she does have a plan that she's working to. But I don't know if it reaches you guys.
G.89	Erin	No.
G.90	Serge	No.
G.91	MC	If we look at how knowledge is used things like [list items] applying knowledge learned from mistakes and from past experiences, using knowledge to ... the survey showed that these activities are also fairly unstructured.
G.92	Chris	It is sort of a rule that if there is an agreement that is in the database, you must use that one and not something else. That's both for KM from a risk point of view and sort of a branding.
G.93	Erin	Other stuff like previous mistakes, I mean that will definitely be unstructured, because there's nothing you'll find on the database, but maybe someone will tell you about a previous mistake, so that's definitely unstructured.
G.94	MC	When we look at how knowledge is created. All these activities rated as largely unstructured, these include [list items]. Can you give an example of why you say it is unstructured?
G.95	Chris	We have some sort of fairly targeted marketing activities trying to get new clients, so we use our resources we use our librarian here in fact to research potential clients, so we do have that process. We've done the same with our competitors as well.
G.96	MC	The final question looked at how knowledge is integrated in what you do, or distributed throughout the organisation. The following rated as formal processes [list items]. While [list items] were rated as unstructured. Can you give an example of any of those?
G.97	Erin	The obvious one is our database of precedents, our case studies.
G.98	Chris	This thing about sharing stories. We don't sort of have a proper debrief after a really big case. Every now and then we do, I mean in our department we do report back to the rest of the department on work that we have done, or work that we're busy with. We have departmental meetings fairly regularly, well, to see who's doing what, and there's a little bit of sharing of information that takes place.
G.99	Erin	And also sharing of knowledge about clients, to see who spoke to the client before, ...
G.100	Serge	We also do cross-departmental referrals, so if I have a trust issue, I'll phone and say look, the client needs a new trust, can you please advise?
G.101	Chris	I suppose also with client things we have a conflict check to check there is no conflicts where you get a new job you'll send an e-mail out to everybody saying we're proposing to act for this person against that person, is that okay? So that everybody in the firm at least knows what's happening.

APPENDIX E

FUNDAMO TRANSCRIPTIONS

Interview

Ref.	Speaker	Content
I.1	MC	The survey highlighted that Fundamo does not have a formal KM strategy. Why would you say that's the case?
I.2	Cedric	We've been sort of a fairly small start-up company. And being small it's much easier to control knowledge because if the concerning people needs to share you can just discuss it with each other. We have in the past have sort of a process in place so certain documentation we do have and store on the networks and stuff, but we don't formally, you know we don't store it in a structured way necessarily. In the different areas in the company they have a certain way of doing it, but there isn't one strategy right across the whole company.
I.3	MC	If you say a small company, how many people are currently employed by Fundamo?
I.4	Cedric	Well up until about the middle of last year we were sort of in the region of thirty, but now we're probably closer to 50. So we've suddenly grown quite a bit so we see a need.
I.5	MC	And the industry that you see yourselves in, how would you describe the industry? Do you consider yourselves a software company?
I.6	Cedric	We're a software products company, so we develop a product, a software product, and we do mobile banking.
I.7	MC	And in terms of the drivers in the industry, what are the things that you need to keep your finger on the pulse for in order to see how things are developing?
I.8	Cedric	Yes, we need to obviously make sure our product grows, with the industry. Okay we are sort of one of the leading companies in the world with what we do. And so we need to get a lot of input from our sales team and from the Internet basically, in terms of getting information around the new technologies the direction of the markets, and then from the sales team we get information around what our clients want to do, and then also some information on traditional banking systems.
I.9	MC	And in terms of competition, you mentioned you're a leader in the field. If you have to describe the nature of competition in what you do.
I.10	Cedric	There are a lot of companies that existed probably two years ago but most of them have gone under. There's now suddenly from the beginning of last year, there's resurgence in what we are doing. And so there are a lot of new people coming into the market and a lot of big companies that are trying to do what we do as well. At the moment most of them are playing catch up to us. But obviously we are aware of them and we're watching what they're doing and stuff to make sure we're always a step ahead.
I.11	MC	Why do you think the other companies, the few you mentioned that no longer exist, what do you think are the reasons for their downfall?
I.12	Cedric	They probably followed a slightly different strategy to us, and it just made it more difficult for them to actually stick around. And we also went through a very difficult period, but we had a slightly different strategy and we had some clients that were bringing in sustained revenue, whereas those companies invested a lot of money upfront, and then was trying to get clients and they couldn't get it.
I.13	MC	In terms of possible benefits from managing knowledge, the survey indicated that the company has identified potential benefits that can be achieved from KM. What do you think those benefits are?
I.14	Cedric	You see we need to, when we need to decide what we need to build into our product, we need to gather all the information from research from our sales teams and things like that, and put it together and then decide what our company's strategy is going to be and what our product strategy is going to be. What new features we want to add. And pulling that information together is easier if you're a smaller company. And we're growing now so we're at a point where we need to find other ways of actually pulling that knowle...pulling that information into a certain structure so that everyone can actually put it together more easily from a wider range of sources.
I.15	MC	And that would help you then to...
I.16	Cedric	To improve our product basically and we also need to make sure that we're keeping up the competition and that we basically keep ahead of the competition.
I.17	MC	Some of the questions might seem obvious, like the following one. The survey indicated that there isn't a formal function within the company to formally look after knowledge management. Why is that the case, what are the reasons that you haven't formally looked at it yet?
I.18	Cedric	We've always known we have a need for it, even if it's just trying to get the format of our documentation standard throughout the company and things like that. We've always been maybe a little bit cash-strapped in terms of having to be able to appoint someone specifically for that role. We have actually appointed someone that will be starting at the end of the month that is just going to deal with, a technical writer, who' s going to make sure all our documents are written in a standard way, that the terms are standard across all documents and also putting in some tools and stuff to put that together.
I.19	MC	And if you look at the different business units or areas within the company, the survey also highlighted that there aren't any designated roles within these areas to encourage knowledge sharing and knowledge use. Why is that the case?
I.20	Cedric	No, we have different business units. Inside each unit the way that information is stored there and stuff is, you know, in an informal way, it is structured. But just within that business unit. A different unit does a different way and another business unit does it a different way. The problem is getting information across those different units. So the problem we probably have in the, well the biggest problem we have in the company is that people can't find the information that is outside of their business area. And we know it's a problem and we're trying to get that information to flow more freely across the business units.
I.21	MC	When we look at technology, the survey highlighted that the technology you currently use within the company does not support KM. Could you elaborate on that?
I.22	Cedric	Most of the business units, apart from the actual development of software, most of the business units just save the stuff in a file structure on the network drive somewhere. Everyone has access to it. And then the typical process is that the people in that business unit basically synchronise that stuff with their local machine, manage it and then synchronise it back.

		And it's done very informally. But the file structure and stuff and the folder structure is in quite a rigid way in terms of each business unit. So that's how most of them work. In the actual development area we actually use a source control system which actually manages the different versions; inside that we can actually do comparisons between different codes and also put our documentation into that. But we can't ... it works really well for code but ... for text documents, but not so well for Word documents or Excel. You can't search that, but we still keep track of the different versions there.
I.23	MC	So does the company have some sort of an Intranet or Portal?
I.24	Cedric	We have a shared-drive which has all the documentation split out by business units and then the information is under that.
I.25	MC	But the interface is a file structure?
I.26	Cedric	It's a file structure. And that's probably the way we prefer to... if we get a tool, we'd still actually have different ways of searching for knowledge, but still have that kind of synchronise onto local machine, and checking back in. Because a lot of people work off-site, so we don't want to have to have access into the system via VPN networks, it just doesn't work for the company.
I.27	MC	If we look at budget, the survey highlighted that the company doesn't have a dedicated budget for KM-related activities. Why is that the case? And the survey also showed that you don't anticipate the company to have such a budget within the next 24 months. Also what are the reasons behind that?
I.28	Cedric	We don't have... okay I'm not sort of THAT involved on the budget side, but we have got budget and we have employed someone starting March to do technical writing to try and get consistency through that. We are looking at putting in tools and we've just put in a Wiki, to keep information, put that in, but we've used open-source software for that; we are looking at a document management system and that might need some budgetary approval, but it depends on which one we use.
I.29	MC	And under the umbrella of what function is all of this done?
I.30	Cedric	The way the Wiki, I actually put the Wiki in, and the way we did was we decided in our ... sort of in the Exco we decided we need to have, start looking at our, the sharing of knowledge, because we have had a couple of people leaving, and when that happens then the information is leaving the company, so we find a need that we actually need to get that written down somewhere at least, and the process that was followed was okay we decided we needed a wiki, we... through looking at other companies what they were doing, and getting feedback from there, we've put the wiki in we just had a basically a staff meeting, and we're small enough to still have the whole staff in one meeting and just go through exactly how it works, and how to use it and things like that.
I.31	MC	And are people currently using it?
I.32	Cedric	It's actually going live within the next couple of days. But I think it was well accepted. I think people will use it. Everyone knows we have a problem in sharing knowledge, so at the moment people when they need to find something out they currently know who they need to go talk to, and they get the information, and so we've basically put a process in where if you need to know something, and it's not in the wiki, then you go speak to that person, and then you have to put it in, the person that gave the information just needs to check it over and then it's in the wiki.
I.33	MC	Because the company is still small, do people in general know who to ask?
I.34	Cedric	Ja, generally. Or they'll know someone who'll know the person to ask. We have gone through a process of getting, particularly in the development team, get a list of people's skills and what they know, understand what parts of the system and understand what external technologies and so we have a matrix with all that information.
I.35	Cedric	It's currently available on the network, but probably no one can find it. That will be linked through from the wiki as well.
I.36	MC	And is that available to everybody?
I.37	MC	When we look at HRM practices, the survey highlighted that there aren't any mechanisms employed to encourage knowledge sharing and use. The options were [list items]. So why is the company not employing any mechanisms?
I.38	Cedric	You see we don't really have a business unit that actually deals with knowledge as such. So even our HR department is one person doing the , actually running the Finance department, and then someone else just deals with things like bookings and stuff. So we don't really have a proper HR section, we don't really have a business unit dealing with knowledge in any way. We probably won't either, unless we do it over to this lady that is doing the technical writing. She's probably going to look at the Knowledge Management System, in terms of the wiki we've decided already that we will be ... once it gets to a certain size, we will be choosing random pages and checking the content, and if it's great the person who wrote it will get some incentive. We are going to start implementing things like that, but we haven't up to now.
I.39	MC	Looking at culture, specifically a learning culture, the survey looked at some informal and some formal activities. The informal activities all focus on encouragement, so [list items]. The more formal activities are managed and include [list items]. All of those rated as unstructured activities and happening only occasionally. What are the reasons for that?
I.40	Cedric	I think the majority is probably happening informally, I mean there's a lot of, there's forever people walking around chatting to the people about stuff. So, that's definitely happening; inside the actual development area where we have the people actually doing the coding of the software, there we actually have a slightly more formal process where stronger developers pair up with a new person in that area of the code and to try and transfer knowledge across, so that has been happening.
I.41	Cedric	I think it is working; I think our biggest problem is getting the information across the different business units. So within each business unit it seems to be working fine, each business unit themselves probably is small enough to, even now that we're growing, for the next two years we'll probably still be small enough to manage that in a more informal way. The development area is probably the biggest one, with the most people there in one area. And that's where we do have some processes in place to deal with it.
I.42	MC	Do you think there is a need for something more formal in other areas?
I.43	MC	Now we look at how the company views knowledge. The survey highlighted that explicit knowledge, which is information, anything that can be captured, or stored in a database, and

		tacit knowledge which refers to experience, skills and know-how - the knowledge a person has in his head, are less than average contributors to the company's ability to compete. . Why is that?
I.44	Cedric	I think the most important knowledge is probably more around the development side in terms of how our software products are put together, and how to change things in there, and more around the actual product itself from a product development side and also from a coder's point of view. And how it works and things. And then also in terms of actually deploying it on a client's side. And that's pretty important I think for the company. I'm surprised we didn't rate higher than that. But then there's , that sort of knowledge stays for a period of time, it's a long term knowledge that you're keeping. Most of the other stuff in the other business areas is more short-lived, so it's sort of dealing with particular, I mean from the sales team when they try to make a sale, and that just stays with them for the duration of the sale. Or for our project management in this area where they just managing the product to get the deployment out; okay there is some long term stuff managing the client, but the majority of that knowledge is actually short-lived in those business areas.
I.45	MC	You just mentioned projects, if something is implemented, do you have something like lessons learned that is captured somewhere or shared in some manner?
I.46	Cedric	We normally, after a project we have a close-out meeting and then we discuss what went right and what went wrong; things like that, but it's not, I mean we basically, it's more informal, I mean we just look at that and think what we should change maybe for the next time. So it's not actually documented as ... I mean it is written in a document, but it's not reviewed. It's sort of captured and analysed at that moment, and then it's never looked at again.
I.47	MC	Do you think a few years down the line things like knowing what's happened in the past, can be important? Or is the environment so dynamic that it would become obsolete in anyway?
I.48	Cedric	I think it can be important, but you need to have consistent metrics that you take over time. And we're not at that point yet where we take metrics in a consistent way across the board.
I.49	MC	When we look at the types of activities within the company, the survey showed that the outcome of activities is fairly predictable, as opposed to being highly uncertain or 100% certain. Why is that the case? What are the reasons behind that?
I.50	Cedric	In terms of when we work on a project, we, it normally got to do with the project planner estimating how long it will take, we have to get that as accurate as possible; so over time just from experience we've got better and better at that; so we have, we go through a process to get to our estimates, then we add on a bit of, we multiply it by a factor to add on for any potential slippage that you might find down the line, which it usually does, and then we get to our estimate. So we're generally getting better and better at it, we're getting more accurate.
I.51	MC	And is that experience embodied in one person or ...
I.52	Cedric	It's in the business in a lump of people, a whole group of people. So, it's specifically in the project management area; they kind of know what sort of factors to add and then for the actual estimating of the development work, that's normally done by myself and the analysts and some of the senior developers trying to get an estimate out.
I.53	MC	Then also in terms of the activities that people deal with on a day-to-day basis, the survey showed that activities are variable as opposed to being exactly the same or totally unique.
I.54	Cedric	Probably in some business areas it is very similar. But we work on a cycle, so in the span of putting out our deployment to a client, that's normally, that just happens over and over again. But because our clients are very diverse and all different cultures and countries around the world, it's always different influences in terms of how we structure software and things like that. Even just cultural differences in how we deal with our clients and stuff. Like the Middle East where they don't work on a Friday and Saturday but they work on a Sunday, that kind of thing. And just how to deal with those things. There are little things in there are bigger things that it lead up to; so those things do change the process a little bit.
I.55	MC	Then we get to the methods people use on a day-to-day basis, were indicated as being very similar. Why is that? What are the reasons behind that?
I.56	Cedric	We've got development processes in place. So, in the development area there's a certain process how you check code out, how you change it, how you check it back in, how you create new branches for different clients, and the configuration management of the system. How you build deployments, all of those things, most of them are automated from near to completely automated. Then when you get more to the project planning side of things, we have templates that we set up, and we know that these are all the things that you could possibly need in a project plan, and they get either taken out a project plan or time gets put against them. And in the sales area there's also, there are questionnaires that the sales people go through with each of our clients; so over time we've built those templates up and put those processes in place.
I.57	MC	And then in terms of the way workflows within the company, it was indicated as being more in a back-and-forth manner, and sometimes in a collaborative manner, as opposed to people working independently or work flowing in one direction only.
I.58	Cedric	That's probably the nature of systems development word. Collaboration is probably more across business units, where we have iterations happening. Once it's fleshed out and it works, it normally flows in one direction within that business unit. And that's, you know, the project plan probably changes initially just while we're getting the accurate estimates out; but by the time we start the development work, the plan is in place, and everyone knows exactly what they need to build and the analysis is done, it flows in one direction. And also around the analysis, is, we talk to the sales people, and get information from them, and the project managers, so then there's sort of collaboration across the business units.
I.59	MC	When we look at the role that knowledge plays within the company, the survey indicated that innovation and creating new knowledge is a significant contributor to the organisation's ability to compete. Why is that so important to the company?
I.60	Cedric	Because we're one of the leading companies in our field in the world, it's very important for us to stay ahead, and so with that we're always looking at new things, getting patents written and approved, and it's just important that we have that information and try and do the things that other people haven't done.
I.61	MC	Do you know how many registered patents you have, more or less?
I.62	Cedric	I think it's ...probably in the region of 30 I think.

I.63	MC	Another aspect that was highlighted was the importance of improving products and services, and of processes. Why is that also important?
I.64	Cedric	In our product we work in an iterative way, so we would put a feature in, and then we would actually refine it over a period of time, so we have this improvement aspect and cycle in there. And then with that, we also bring new features. So we are strong in making things better, and because also we're sort of leading edge at what we're doing, we don't necessarily know the solution, until you actually put it out there and might find that you change it slightly to work in a better way. So we continuously try and refine and make things work better.
I.65	MC	The last few questions look at enactment, knowledge related processes. In terms of coordination of knowledge related activities, all of them were rated as being unstructured. These were 'indicating the direction in which knowledge should be developed' [list items]. Why are these activities currently unstructured?
I.66	Cedric	I think we're going to be forced to become more structured; It's not very structured because we have been a smallish company up to now; everyone knows everyone else's skills, or used to know; we're now growing significantly, so we know we have to get a more structured process in place and will have to manage that, and we have gone certain ways since August in terms of getting that in place, so we have put in a skills matrix, we always had an informal way of managing, especially in the development area which is the biggest area, certain people are good at certain things, and we try to keep them in that area, and try and transfer their knowledge to someone else, so when a new person comes in, then we'll try and pair them up to try and share knowledge and that kind of thing, so it was more of an informal thing, but everyone knew who were strong in which areas, and if we were under time pressure, they were put into that area by themselves, and if we had a bit of leeway then we'd have someone working with them; so i think it's just the nature of the size of our company and we know we have to change and we are putting things in place to try and get it more structured.
I.67	MC	Knowledge use
I.68	Cedric	Well we'd have in terms of what features we're going to put into the product next, we have a formal process exactly. The sources where we get that information from, and how we prioritise that and decide what goes into the product. So that actually is in place. and then also in terms of, like the actual documentation on the product itself, the actual specifications of what has been written by developers, that's pretty structured and it's always done in the same way and in a very structured way. So in some aspects we have things that are very formal; in other cases it's less formal.
I.69	MC	Knowledge creation [list items].
I.70	Cedric	They are largely unstructured, but we are doing almost all of those things. I think it's sort of working fine at the moment; we want to put more metrics into our projects, but we also don't want to get bogged down with capturing all those metrics. So it's a fine balance to try and get that. So what we're actually doing is we're looking at our processes again. In July we got a consultant out from the States to look at our end-to-end processes and just around getting more agile as a company in terms of how we develop quicker and then also in terms of the documentation or knowledge that we actually stored about our product, to keep it at an absolute minimum but with as much in information as possible. We don't want to be wasting time, because at the moment we waste a lot of effort writing stuff which is never looked at again.
I.71	MC	And the last question looks at how knowledge is integrated into the organisation and was again rated as largely unstructured and included [list items].
I.72	Cedric	As I said we are putting a wiki in place to share knowledge across the organisation with that; which is more going to be the more informational kind of stuff. We are putting a document management system in, so that will also, at least people will know where to find all the information because it's all going to be there. At the moment it exists, and the people who use it all the time know where to find it, but people that need it infrequently haven't a clue and can't find the information. So that will have searching through Word documents and Excel and everything. That we know we've had a need for it for quite a few years now. It's been a big problem. We're going to try keeping the Wiki as informal as possible. So we haven't actually put someone in charge of managing the wiki. We might need to over time. We are going to split it out into different areas; so you categorise your things under certain categories. So you add a little bit of structure to it. But we want to try keep it like the true nature of wiki should be, so just let it evolve to the correct information come in. And we've set it up so that you'll know who edited it so you can actually send an e-mail to that person or chat to him and say listen I don't agree with this. So we're going to try to keep it informal, but we might have to put somebody in charge.

Focus Group Session

Ref.	Speaker	Content
G.1	MC	The first question looks at strategy and the survey results indicated that the company does not have a formal KM strategy. Why is that the case? What do you think are the reasons?
G.2	Rosemarie	It is in the process of changing, because we've got this wiki that people are working on to have a central place where knowledge can be stored and shared. I think the why it wasn't there in the start, is that the group was so small that knowledge was just shared, it wasn't really managed.
G.3	MC	Does that mean the technology equals a strategy?
G.4	Rosemarie	I think the strategy behind that is to start gathering the knowledge and storing it and also making it easier for people to ...
G.5	Hannes	… to access it
G.6	Rosemarie	…to gain knowledge ja.

G.7	Hannes	To formalise the ... I mean to formalise the process around it. Because I mean you can't believe how much knowledge is lying in those books over there and stuff, I mean it's not just information, it's a lot of knowledge, and it's knowledge that in some instances, I'm just taking you [Lenie] as an example, it goes for everybody, Lenie and so forth, that I have created, we've just moved, so I have still another six boxes of there. You know how funny it is to open those books and to see [gasp] ... do you remember M-squad what we did with them? So there is... I think access is the problem. And structure to navigate through it, that is what is a problem, because we have created such a lot of information which if we put it in context creates knowledge, but we don't know how to access it. Even the stuff that I've created myself, I don't even know where to get it and how to navigate through it.
G.8	Lenie	But Hannes don't you think time is one reason as well, because I always thing when I'm coming back from a client that I must do this and this and this and before I get to that, because I must book some documents back into my place where I keep all my documents, then there is other stuff that I need to do. I think that is...
G.9	Hannes	Ja, but don't you think that if we have better structure then it would be easier for you? I mean I started a, what I started doing is just for my own sake is when I have a thought on mobile banking, I blog it. And I've been doing that now for almost two years. And it's amazing the stuff that I've done, and it's searchable now for me and it's accessible. So I ... just the fact that I've started using a blog, created the structure of accessing it. I think the biggest problem is that we were a very ... I mean we're a start-up, and during the start-up phase we ... nothing was formal and we were a bunch of people hunting together and we spoke to each other and it was very informal, but as we're getting bigger now. I mean all the people here I know, but I walk through the office and I think ... [suggesting Who is THAT?] ... for a moment I thought you're also now working for us! [laughter].
G.10	MC	Just for interest sake, when Fundamo started out, how many people were you then?
G.11	Hannes	One [laughter]. And I mean we've had quite a, because it's a stressful environment, a lot of pressure, you know a lot of things that is unpredictable; I think we've had a very big turnover. I think of the people that started initially, it's just me and you [Lenie] and Delene that's left.
G.12	Lenie	And Pat.
G.13	Hannes	Pat I think, Pat and Adriaan and Cedric were immediately after that. But I think we are.
G.14	Lenie	You can look differently to us. [jokingly].
G.15	MC	And in terms of number of people, do you foresee the company to grow significantly?
G.16	Hannes	It's a reality that you have to do that now. So I mean that is part of why we have to formalise it. And I would say it's a strategy, and the wiki is an instantiation of the strategy. But the strategy is we've got to formalise it a bit more.
G.17	Martin	Ja, the wiki is pretty much an informal knowledge a base. There is an informal one which is all lovely ideas and things that you can think of and help people, but I think there's also a place for a more formalised structure of actual documents that you need in your day-to-day processes; and where and how you navigate through that and what you used.
G.18	Hannes	There's a bit of it in place but it's not working properly and we will put...
G.19	Lenie	And it must be easy as well.
G.20	Hannes	Yes.
G.21	Martin	There was the knowledge tree thing that you started way back when.
G.22	Hannes	Ja, I mean we had stuff like that in place, but we are, we've appointed a dedicated person I think that starts the first of March or whatever, so we need to formalise it.
G.23	MC	And what are the benefits that you expect from formalising it?
G.24	P5	I really believe if it's like that, then we will talk from one mouth. Because I will have a set of documents, Martin will have another set of documents, so what do you give to the clients? I'm giving something; he's giving something; so then we can start to talk as "Fundamo".
G.25	Hannes	Do you think it will make it easier for you to just store the information as well? You get back from the client; you know where to put it.
G.26	P5	Ja and it must be quick, because I don't want to spend a whole day doing that. It must just be quick.
G.27	Martin	At the moment I ask a question and I have learned sort of where to find documents, but you end up finding ten different ones. And it takes me 5 hours to figure out ...
G.28	Martin	...which one is the latest, and there's never ONE that's the latest; so there are latest bits in all 10 documents; so it takes a huge amount of time to consolidate all of that into a single document that I can use.
G.29	P5	…which one is the latest...
G.30	Hannes	And then the worse thing is if you've written something, and you know you've written it, and it was a great document...
G.31	Martin	And now you can't find it, ja.
G.32	Hannes	If it's on the right drive, if it's backed-up in the right place, and so forth.
G.33	MC	The next question I want to ask you is about technology. You've indicated in the survey that the technology that is in place does not support knowledge management. Why is that the case?
G.34	Martin	There is no single repository for our documentation. Version control and the management thereof is done pretty much informally through Word and your file naming conventions, if you remember to save it as a new version and put track changes on and things like that.
G.35	Hannes	And I mean what aggravates it is that people are travelling; they prepare documents in hotel rooms and on airplanes where there is no connection. And then you store it somewhere, so we really are challenged to have a distributed management system. I think, I mean there definitely are elements of everything, but because we are such a quickly expanding, I would say some of the challenges... training, you know, getting new people on, and the fact that distributed; and that we are under severe pressure. You know, we are working very

		fast and we, there's nothing that I think anybody does in this company which they do at their leisure. It's just impossible. I don't know, do you do stuff where you have AMPLE time available [directed at Participant 3]?
G.36	Lenie	Yes I have that [jokingly].
G.37	Hannes	Did you just return from that trip or are you still going on that trip?
G.38	Lenie	No, I'm back from that trip [laughter]. But Hannes the funny thing is, people think that when one travels, one has a lot of time to look around; every evening I had to complete documentation which I had to send out the following day. Some evenings I thought I should rather get up early the next morning, because I'm so tired; but you go back after a whole day of training, and in the evening you need to complete the documentation, because Pat is waiting for it, Nigeria is waiting for the stuff, so you just continue.
G.39	Hannes	And the places we go to has limited infrastructure, you know. The perception of people is that if you were in London a few times and you stayed in a hotel or wherever, that there are so many wireless Internet connections, and if your computer crashes you can quickly … you know…We work in places where it isn't like that.
G.40	Lenie	No, it isn't like that. You are lucky if you can get around to your e-mail once a week. IF you can get to it at all.
G.41	Hannes	So it's an extremely challenging environment. I mean, what was your schedule... your flight was…
G.42	Lenie	I left for Lagos on Tuesday, returned Saturday at 11, left Sunday at 12 for Bahrain, landed 11:00, was picked up at 12:00, started with the training at 1 until 6 in the evening.
G.43	Hannes	So that's the type of things our people are exposed to. You must schedule time if you want to read your Bible.
G.44	Lenie	It is really like that, but it is great.
G.45	Hannes	That gives you a bit of an idea of the complexity, because in the process, as Lenie says, is the, she's now busy training Bahrain, and she experiences the reality of what the people want, or the market or whatever, and then she documents it in the evening…
G.46	Lenie	Yes.
G.47	Hannes	...because tomorrow she's going to work it into the course; she thinks of new case studies; because these guys are for example much more focused on money remittance, where our previous markets were more geared towards person-to-person payments, which is more or less the same, but different.
G.48	Lenie	It works differently.
G.49	Hannes	She gets new insights; she documents it; she presents it. And she stores it somewhere on her laptop. And when she gets back, she already has something else to do, and she has not even recovered from het jetlag yet, then she has to start sharing it with us. And that is a big challenge.
G.50	MC	Next we look at incentives. The survey results indicated that no mechanisms are employed to encourage knowledge sharing and use.
G.51	Rosemarie	Informally on the development side with the wiki there was a suggestion that we put up a spotlight on a random page every now and then and just informally recognise the author or the contributor. So that's an example of a mechanism.
G.52	Hannes	I think we actually have informal incentives. I think the style of the company is if Martin comes up and says guys, this is what I thought of and this is how we can, and so forth, then there's a celebration around it... "great idea!" and so forth. So I think there is an informal. But we definitely have to think about how we do it formally, because that's how you change behaviour. It can be monetary as well; I think it's not bad to have it. I think the reason why it's very difficult to incent it is because we don't have structure around it.
G.53	Rosemarie	Ja, so it's difficult to measure.
G.54	Hannes	So we can't say you've added 23 and if we do the formula then 23-times so much is, you know. But I think it's important that we should move there to really incent it. I don't know how to do it.
G.55	MC	In terms of a learning culture, [list options from survey results].
G.56	Martin	We definitely encourage that; not in a formal manner. But certainly in the development environment where I started and worked, we practiced what they call pair-programming...
G.57	Hannes	I think that's a formal thing.
G.58	Martin	It is formalised, so there the idea is knowledge sharing to pair an experienced person with a lesser experienced person. And also so that you don't get stuck with specialists in certain areas of the software, so you can transfer knowledge across and all the different aspects of the software.
G.59	Hannes	I would say that's almost a formal mentoring process.
G.60	Martin	That is a formal mentoring practice.
G.61	Hannes	And we've tried to change it sometimes, but we always seem to come back to saying that this is the way; especially when you grow fast with lots of new people coming in, it is an important mechanism and it seems to work for us.
G.62	Lenie	And I think the kind of environment that we move in, forces us to learn all the way, otherwise it was easy. Have five developers, copy and paste; just change the labels and stuff, it's not. Every new client we have to go back to have a session thinking how are we going to do that. I think that forces them to learn all the way. I think that's why they get stuck there, because it's not boring.
G.63	Martin	Ja, I can definitely say I never had a day of doing step 1 to 10
G.64	Lenie	..of doing the same stuff, no...
G.65	Martin	...of what I did yesterday.
G.66	Lenie	Sometimes I wish for that. Sometimes I sit nearly in tears thinking why am I not working at the Post Office, where I can just do the same stuff and go home... [laughter]

G.67	Hannes	It does happen... it does happen... [laughter]
G.68	Martin	It's a high-pressure environment.
G.69	Lenie	Too much work, too little time, I like that!
G.70	Hannes	I think we also, we do support people studying. There are a number of people that are studying, and we support them financially, but also, I mean old Freddie's doing his dissertation on very applicable stuff in his work, although he's doing it after hours. We don't allow people to study in-hours; well they don't have time to do it; I think that's one thing we can mention. And we started getting external people now as well; We're getting Mary Poppondick who is an internationally renowned expert in our space, to come and stimulate some thoughts and things like that. So that's also happening.
G.71	Martin	And I've been fortunate in dealing with people from Accenture or outside clients when you travel, to get exposed to different ways of doing things.
G.72	Lenie	So you learn all the time. And just on that. People that study, it's not they get input from the people of the level, here I must say that they really get good feedback from people where I don't know where Hannes find the time, but still he finds time to spend with them as well.
G.73	Hannes	Studying, I mean, there's really a philosophy of saying that formal study is important, you know. People that are prepared to put in a little extra, we'll support them, because it changes their, it helps them grow. I think what Martin [participant 4] said is very important as well, is that we are a small company, but we have interaction with this diversity of other big companies; and I mean I would say if there is a company in my perception that's very good at KM, it is Accenture. And our exposure to them, we're working very closely with them; gives us perception. Even working with S1, you know there's, as a matter of fact the wiki was born out of S1; so our exposure to different companies and their view of; it's almost like we see things that we like or that's applicable on us; I think that's a big stimulation for how we do things. And also to recognise it internally. I mean I think the environment in creating knowledge about our area of expertise, and I mean we've spoken about these things; we have a high-pressure environment; with lots of challenges; lots of problems to solve; we interact with these clients and companies and so forth; there is a culture that celebrate new thoughts; and so forth; I sometimes feel the biggest problem with us is we actually don't have a clue of what we have. And we're not proud enough of it; and you know sometimes I see what other people are doing in this space, and what we have, we are ages ahead of anybody in this space, in terms of our knowledge. In terms of the organisational capability about solving a problem; I mean I always said we solve problems, or we have the solutions to problems that most other companies don't even know are problems. Let's take S1; you know the kind of things the American market dictates, and the things, the solutions, I remember when Craig arrived there in Atlanta, and they had a presentation, him and Cedric, and they started saying this is our product, you know, and when they got past the mini statements, the guy says jissee, this is great, and Craig says but we still have to days to talk about stuff.
G.74	Lenie	I realise that a lot in my training when the people say "wow!" That I get; and then I realise we are really great.
G.75	Hannes	For me that is sometimes the thing that I really fear is that, and it's actually happening to us at some stages, people make announcements about things, and they get a big spotlight on it; and we think why did you make an announcement about that?
G.76	Lenie	It's so last season [laughing].
G.77	Martin	Ja, it's common knowledge.
G.78	Hannes	I mean I wrote an article on my blog where I think it was Lloyds made an announcement that they do alerts for transactions; this was a few months ago; and I wrote in the blog that if a South African bank didn't have it; if Lloyds were in South Africa it would reflect very very bad on them that they actually made an announcement because it would show to the consumer how far behind they are compared to South African banks.
G.79	MC	When you look at different types of knowledge, explicit knowledge refers to information, things that you can capture in documents or a database, it's easy to express; tacit knowledge refers to know-how, experience or skills. The knowledge a person has in his head, but cannot easily express. The wiki you described is focused on capturing explicit knowledge. On the tacit side, other than the pair-programming that you described, how is it typically shared in the company?
G.80	Rosemarie	I think the open-plan seating arrangement helps with that; somebody will be sitting there swearing at his computer if there's a problem and suddenly figure it out, and now everybody wants to know okay now what was it that was so bad, or what did you do to get yourself out of this three-hour struggle, and that seems to work.
G.81	Lenie	Now and then we have these sessions that we shared for instance the security stuff, that Melvin just gave a session...
G.82	Hannes	What do we call it...uh...
G.83	Martin	Brown-bag sessions.
G.84	Lenie	Brown-bag sessions.
G.85	Lenie	And I think that works nicely.
G.86	Hannes	But there's also a culture that sort of we... I'm thinking of Freddie for me is tacit knowledge, you know. He does things which are sometimes scary but it seems to work. And you know he's quite happy to talk about it. As a matter of fact he comes back and tells you, 'you know what I did?' [laughter]. And there's a general ... "good, share it with us".
G.87	MC	Could you perhaps just elaborate a bit more on the brown-bag sessions?
G.88	Lenie	For instance we'll get Martin to hold a brown-bag session, if he has the budget he can buy some pizzas; so the whole idea is that it's lunchtime, you bring your food; you sit and eat while he just talks about what he's doing; what is the new stuff that he has added.
G.89	MC	And is that happening every month? Or is it ad hoc?

G.90	Hannes	No, it's totally ad hoc.
G.91	Lenie	Yes, you just book a session.
G.92	Hannes	And people don't have a reason not to attend, because they bring their food; they would have eaten anyhow.
G.93	MC	And even though it's ad hoc, is it happening fairly frequently?
G.94	Lenie	Ja, not this year. No, this year we've had two sessions already. And I think the people enjoy that. It's not that suddenly there's just one person that's attending it. It's everybody.
G.95	MC	Then, in terms of the type of activities, the outcome of activities was indicated as being fairly predictable; as supposed to being highly uncertain or 100% certain. Why is that the case? What are the reasons behind that?
G.96	Hannes	We actually said that it's fairly predictable? I would say there are a few things. You [other participants] must help me. I'm checking it now from the outside. We have a relatively good estimating mechanism, based on experience; okay, we're getting much better at estimating things; Relatively good. I always think we over estimate, you can do it quicker, but, nevertheless we seem to be getting it right more and more. More frequently. I think we have very good capability, which is a function of process and people and so forth around quality assurance. Extremely good. And I think that helps to... even if something was done with strings, in quality assurance it will get found out. Lenie will find a hole, and the people that work with her. I mean those are two things that I think makes us do... you know predictability is around planning first, and so I think our planning is not 100% there, but it is better than what, and it's getting better. We are learning about it. It can be more formal; it can always be improved and so forth, but ja.
G.97	MC	And in terms of the estimation. You mentioned that it is based on experience. Is it embodied in one person or is it more like a collective experience?
G.98	Martin	It's a team effort. It starts normally with a sort of preliminary estimation at a high level; which is fairly accurate. About 80% accurate. And then the next level is the whole team gets involved and each one has a change to give input.
G.99	Hannes	And they are refining it, hey?
G.100	Martin	Ja, it goes through cycles so...
G.101	Hannes	I think the thing that we sometimes make a mistake on but we're learning that as well is that we're not trying to re-invent; we are taking stuff that seems to be working, and we're refining it; increasing the accuracy of it; sometimes we make the mistake of doing things totally different, but it seems things are working for, we're fine. We get better at it.
G.102	MC	And then in terms of the methods used, in doing whatever you're doing on a day-to-day basis; the survey results indicated that the methods used from day to day are very similar.
G.103	Martin	I think it depends on where you sit; especially in the development environment, that factory works the best when you can keep things as stable as possible. So you try and keep as much of the noise and unnecessary clutter away from them; and give them a task for the week or the day or whatever and then they sort of go through the same motions every day, to satisfy that outcome. I think as soon as you move away from the development environment that is not true.
G.104	Lenie	I agree.
G.105	Hannes	Ja, I think, let's take something like how do we develop a proposal for a customer; okay. Even how, and that's getting more formal; and the activity is the same, even though the content within the proposal is very very different; if you think about pricing and so forth. I think we are getting activities, you [Participant 3] train people, there is sort of the activity, how you prepare, how you get there, what you do during the time, what you do at the end; there is sort of a method to that, but I think what Martin, and I think - you must correct me, is, what goes into those containers are so different every day, so different; that it's almost a redo every time. Sometimes.
G.106	MC	Then, in terms of the role of knowledge in the company's ability to compete, innovation and creation of new knowledge was highlighted as significant contributors to the company's ability to compete. Along with improving existing products and services, and processes. Why is that important?
G.107	Hannes	I think we innovate so much that sometimes it holds as back. We almost, I mean we, I'll give you an example. We're now integrating into another payment switch; with our clients in Bahrain, and so we get specifications and we start building to the specifications; and then our guys say have you thought of this, have you thought of that? Which are all valid, and those guys obviously haven't thought of it; because we are so way ahead of them, and then we delay the project. While we could have just integrated into it according to the specifications. So we tend to see things that the rest of the world doesn't always see. And that sometimes is almost, I think you know, if you're an individual like that, then in the old days you would have been certified; you must be mad, why do you want to do it like this? But in the meantime the guy had invented the jet engine, you know. But the world wasn't ready for the jet engine yet. So we are sometimes disconnected from what our environment requires.
G.108	MC	The final questions look at Enactment, the knowledge processes in the company. The first one looks at coordination of knowledge-related activities. And include things like [list options]. Indicating the direction in which knowledge should be developed; Those were al rated as unstructured.
G.109	Martin	Ja, I think it started with a whole skills matrix for everyone working in the company;
G.110	Rosemarie	That has been done before though;
G.111	Martin	It has been done, but I don't know, ja, it sort of started and then nobody followed through; hopefully this time it will follow through. But I think together with that, goes the whole roles and responsibility matrix of what you need within the company and find a match of skills to your different roles. That's the area where people need specific training or certain knowledge or whatever the case may be, in able to perform better.
G.112	MC	Is that happening again?
G.113	Martin	It's happening again and hopefully this time it will follow through.
G.114	Hannes	It's got to become more formal.

G.115	Martin	Ja, I think the psyche evaluations that we did where everybody sort of participated on a voluntary basis, is also something that we've gone through. In terms of our psychological make-up. What that looks like, and we're getting reviews now; on an individual basis and hopefully identify areas of development.
G.116	MC	And in terms of the environment the company is operating in, the types of knowledge that for example goes into the wiki. Will people know by themselves what should go in there? Or is there a formal R&D plan; this is what we're going to research; or is it more unstructured?
G.117	Rosemarie	I think it's unstructured.
G.118	Martin	Unstructured for now, ja.
G.119	Hannes	The agenda is more unstructured. The agenda is definitely more unstructured. I think it is somewhat guided, but it is more guided by short-term realities.
G.120	Lenie	Mmm.
G.121	Hannes	So, Western Union is like, how do we integrate to Western Union; that's a short term reality. I think something that you may just want to make a note of, is we do have a somewhat formal patent management and trademark management process in place; you know, we have quite a portfolio of patents, we try and renew it; we try and harvest that; there is a process of sitting around and saying what are the things that are patentable? Extracting it, formalising it; Take it through a process you know and then get it submitted; we track our patent portfolio in terms of things that needs to be done to make sure that we harvest it frequently; that's also being managed.
G.122	MC	Do you have metrics around that?
G.123	Hannes	No, but we constantly sit down at times and try and harvest it and look at what are the things that need to be patented. And there is a process of how it gets first-cut written, goes to the patents attorney, as it gets submitted, we take conscious decisions in terms of where do we go with it, where do we submit it; and as we get feedback on it; so I think that is relatively a formal process. I mean that's formal IP. To be quite honest, we're actually formal about it, I'm personally a bit doubtful about the value of it; but hope it will come out in the wash; because it may just be that one of our patents is going to be a real jackpot. We've had a few like that. One of them we actually couldn't take through all the way. We had a patent that says mobile payments is done in certain way, to a certain design, is the only electronic payment that is irreversible. Because cash it irreversible. If you cash it, it disappears, it's gone. You never get it back. But most other electronic payments are reversible. I thought that would have been a real win, but we couldn't get it through the European Patents and so forth. There are a few others, but, so maybe one of them comes off.
G.124	MC	Is that a team function, or your function?
G.125	Hannes	Well I look after it at the moment, but people are involved.

APPENDIX F
POLYCHEM TRANSCRIPTIONS

Translated interview with manager responsible for knowledge management

Ref.	Speaker	Content
I.1	MC	To begin with first a few background questions. How many employees does PolyChem have?
I.2	Frank	It is 162. And we are currently busy with retrenchment, so it probably minus 20%.
I.3	MC	Am I right in saying that PolyChem operates in the chemicals industry?
I.4	Frank	Yes, we are in the polymer-chemistry industry. Polymers – we manufacture polymers for the injection moulders. They use our product in making moulds.
I.5	MC	And if you have to describe the industry in terms of drivers of change – what are the things you need to look out for?
I.6	Frank	I think, in terms of drivers it is … maybe I should first just give some more background. We basically started out as are cycling company. We received our raw materials recycled from SA Nylon Spinners, which we then extricated and then added value to. And then we sold it to the moulders. What has changed since is that the suppliers of the raw material, Nylon Spinners, is busy closing down, so we had to move away from recycling and had to start purchasing polymers from all over the world and do the compounding of those polymers. So our basic drivers at the moment is the type of raw material that can be acquired, your movement in the market in terms of what is happening in the market, and then we are working with Du Pont, our technological partner. So we get a lot of our technology from them and manufacture under a license for them. But it is not a commercial partner, in the sense that they prescribe to us what raw materials we have to use, which they then sell us, and our margins are getting smaller.
I.7	MC	And if we look at the nature of competition within the industry?
I.8	Frank	Yes, the nature of competition… basically we have 40 competitors … mostly companies that are competing with Du Pont, for example Bayer, and other big companies in the chemicals industry. Then there are a number of smaller company groups that are traders – people who, with the current Rand/Dollar exchange rate, can afford to import the products, and then sell it for less than we can manufacture it for. And that is our main competition.
I.9	MC	Given all these things, what would you say are the characteristics that can make your company successful?
I.10	Frank	First, if you can go to that extra bit of trouble in delivering a service, because you are doing your own compounding. In other words, you are local. Second is the issue of local content – because the stuff imported from abroad is not local. Particularly the motor vehicle industry still focuses a lot on local content. And then to look at an improvement in technology partners. Du Pont is not our only technology partner, we also have BigFix … we have a whole bunch. It depends on the products we are selling and our overseas partners.
I.11	MC	Now if we turn to the survey. The first question looked at whether you have a formal knowledge management strategy, and everyone answered “yes”. Why did you decide to implement a knowledge management strategy?
I.12	Frank	About 10-12 years ago we realised that, in order to move forward and to survive, you must have a knowledge database. And we looked around, looked at various software and we decided on Lotus Notes. First, Lotus Notes is ... it is visible, it's easy to work with, it is easy to program, but I think we're still not there. We're definitely not there yet. That’s the one part. This is the part where you have your customer relations management, and you have your knowledge what we call lessons learned. Where we use Lotus Notes … for example, all the customer visits. If you have a customer's name then immediately when you open it, it is linked and you can see how many visits he has had from 1991 onwards; What kind of customer complaints you dealt with; What kind of development you have done for their products; What kind of technical service requests you have received; What kind of core reports you have done. So immediately you can sit in front of the customer and negotiate with him. The second thing is that, the idea of Lotus Notes, is the database with your MSDS - Ministerial Safety Data Sheets; your drive of the ISO 9002 system, your TS-ISO 16949 system; your Health and Safety system, everything managed in Lotus Notes. Because it has a workflow application, you can use it for that. That's the one part. The other part is the financial part. And there we have switched to Microsoft Dynamix AX. And basically where it is of great use again, is where you can enter KPIs and your balanced scorecard and initiate it, with dashboards and a whole lot more.
I.13	MC	So basically what you are saying is you decided that in order for you to manage all the information, you need to implement knowledge management in this manner?
I.14	Frank	Yes. It is not structured in the sense that you are going to say you have a strategy for knowledge management, but it's a matter of not wanting to lose it.
I.15	MC	So you say this is not a formally documented strategy?
I.16	Frank	It is formally implemented in the sense that there are different databases which a person can, if for example he is experiencing a problem at the plant tonight, he should log it in Notes; and if someone else experiences a similar problem, he won’t need to call the foreman every time. He can look in the “problem solved” and “problem analysis”. But it is not documented as a strategy.
I.17	MC	All survey participants have indicated you have a formal strategy. What would you say is the reason?
I.18	Frank	Absolutely, because they use the database on a second-to-second basis.
I.19	MC	If we then look at the focus of KM that you want to achieve, you have indicated "knowledge is central to our business strategy." Then there were other options such as [list items].
I.20	Frank	It depends on the area you are working in. For example, your technical department will focus more on innovation, while production people are more focused on plant maintenance, production and such things.
I.21	MC	Then, the survey also indicated that the expected benefits of KM are better decision making. Why would you say it's important to you?

I.22	Frank	Absolutely. An example I just gave of the procedure where a person needs to call an outside person - he can immediately see all the informaton. Other examples are, as I have already said that you can sit with a customer and say 'I was here 5 years ago and I did this, and discussed it with you, with such and such, and this was the decision we took based on pricing increases. These were the factors and criteria used, and everything is visual. For me knowledge management is about transparency. You can instantly communicate with your client or you can move forward, because everyone can immediately see where in the database the information is.
I.23	MC	You just mentioned the different areas. Are the Notes databases used in, for example, the R & D environment as well? Or do they have their own knowledge management initiative?
I.24	Frank	Yes. No, it is shared. It's very transparent to all. Remember, if I want to comment on the Research and Development Service's technical reports or other stuff, then it is available. But I will not understand half of it. But this is how we work. All the development is about, we use a process they call APQP, it's a 23-step process which starts where you and the client sit together with the idea, and then you start and say okay let us work through these steps. Our work is in steps throughout, and everything is transparent within the database. You can immediately decide where you are with this customer, what development and how far are you from commercialisation. It consists of 5 phases. It starts with the planning phase and continues through to the commercial stage. And in each phase is a 6 or 7 steps one must complete.
I.25	MC	And is this process unique to you?
I.26	Frank	No, it is part of the TS-16 949 for the Automotive industry. See, it indemnifies you from consequential damages. It is a quality system in the sense that if, for example, you have a problem 10 years from now, you can say right, we have gone through the whole process of APQP, there was a warranty sign-off, you have accepted it, there are no consequential damages for Recalls and such things. You know, we have a simple thing, we take raw materials, let's say for the auto industry, and then you find that in 10 years' time, something happened to one of our products, and a lot of people's cars are recalled as a consequence. That's why we need the database and why we need to manage the knowledge in it.
I.27	MC	Good, if we look at the structure. There were different opinions about whether you have a formal knowledge management function. You have indicated you have a formal function. Can you tell me more about why you have such a function, and how he works?
I.28	Frank	A formal function, not in the sense that it ... It's all centered on the different types of databases. And each database has certain inputs and certain outputs, and the database is not viable if it is not maintained.
I.29	MC	And do the databases have owners, and is centralised or decentralised?
I.30	Frank	Yes there is ownership, and it is spread out. For example the Corrective Actions are handled by me. If something happens in the factory, then you run a Corrective Action. There is a workflow process. Your customer service side is again handled by our Sales Manager. Your Supplier Management is handled by your Buyer; all the problems you have with a supplier go into a Supply Management System, so yes it is driven by the functional head of that area.
I.31	MC	In terms of the information stored in the database, is it analysed or further exploited at some point, or is it just that the information is entered, and people use it as they need it?
I.32	Frank	No, for statistical purposes, we use it a lot. Say, for example, as I just said, where we have KPIs and dashboards, it is almost exploited on a daily basis. To analyse it. You know, we also use many ... last year, for example, to help decide what kind of products one should explore further, what do you want to sell, a specific product, project, and such. And then of course your specifications. We use a statistical analysis on our specifications, you use statistical process control where you go to certain information that has been entered and you sit with the customer and say let's see where we can improve. Continuous improvement.
I.33	MC	And in terms of the different roles within the business units; there doesn't seem to be dedicated roles to encourage others to share and use knowledge?
I.34	Frank	No, I think it's more a case of if a person doesn't do it, the wheels come off. In other words, if he doesn't provide input, then another person in another unit sits with a mess. And as I said, Lotus Notes is not a static system. And what we develop in the system, what I had also been involved in, are agents; where you specify that if this happens then that guy gets prompted to do this or that. Or if it happens, and it is not done within 5 days, a flash message is sent to him every half-hour to remind him. People use it a lot. Every guy can prompt himself, in other words, he can go into a database and say if anyone put something in this field, notify me immediately. And they use it. Because they know it's the only way you can manage it.
I.35	MC	The next question deals with technology, and we have talked a bit about the technology already. Would you say your knowledge management initiative is driven by the technology, or are there instances where people exchange knowledge in a more informal way of, or other forums perhaps?
I.36	Frank	Yes, we have a ... Oh; one of the things of the database is that it has a Minutes database. All the minutes of each meeting, whether a Health and Safety committee meeting, or a Continous Improvement meeting or an Extra Ordinary meeting, the minutes will be put in the database for all to see. And action points from the meetings are also driven by it; people are constantly reminded that they still have to do this and do that, and it is outstanding ... What we are trying to move away from is that a person has all the knowledge in his head. He'd all the years of experience, and the day when he leaves then the company is in this absolute ... doesn't know where it is. Then it's gone. Especially on the safety side, we use our knowledge resources quite extensively. So if there are any, let's say, engineering innovations, and we want to construct a new plant, then you have all that knowledge of previous accidents, then you use all the data you gathered over the years. Let's say I want a new office building. What does the office need? It needs tables and chairs. What kind of chairs should you use, let us see. What kinds of accidents have happened over the past 20 years with this type of chair.
I.37	MC	And is it used actively?
I.38	Frank	Absolutely. It is actually prescribed functionally. We belong to the xxx Group and we are part of the xxx group. So it must be used. And then of course you have the ERP system that you use to drive your product. We are an MRPII company. So we use all those Master Scheduling, Master Production; we use it daily. And our Plant Maintenance programs are driven by it. Project management, everything.

I.39	MC	You've now mentioned that, if someone leaves the company, you do not want all that knowledge to leave with him. So apart from capturing information in the database, do you have a mentorship program or something that is separate from the technology, that is used to share knowledge, let's say through training formal discussion?
I.40	Frank	It is not knowledge in the sense ... We have a process whereby we train operators; they come as a trainee operator, and immediately get a mentor who oversees his actions for a year and a half; then competency tests are conducted; with a panel of 4 or 5 people on the basis of ... it is like obtaining a driver license. It's only an assessment. We do assessments and then afterwards, the person becomes an assistant operator for 2 years, where there are certain things he should do, and then after 2 to 5 years he may qualify as an operator.
I.41	MC	Good, you indicated you do not have a budget specifically for KM activities, and that you don't foresee that you will have one during the next 24 months. Why not?
I.42	Frank	Budgets yes, in the sense that our ERP system is absolutely budgeted for from A to Z. It was a R6m system. And we have used an outside organisation to do the project. That has been budgeted for. Now, you might require a payroll module, then you budget for it, or maybe the Balanced Scorecard module, then you budget, but not specifically under the banner of KM.
I.43	MC	If we now consider mechanisms to encourage people to share knowledge and use; you have indicated that you have no mechanisms or incentives specifically for this purpose. Why not?
I.44	Frank	We do have appraisals, where you can put KPIs in. But not for usage of knowledge management. So you know that if a person is not using the knowledge base, it means he isn't doing his job and the wheels come off. He is the guy who suffer as a result. So no, we don't look at that, because for me it basically means that if he is not using it he is shooting himself in the foot. Why do you have to incentivise someone to do something that is part of his work?
I.45	MC	And if we look at the culture within the company: You indicated that employees are encouraged to explore and experiment, encouraged to ask others for assistance when needed, encouraged to discuss their work with people in other teams ...
I.46	Frank	It is done continuously. Informally, continuously. If you leave your office you can see in another office, 3 or 4 guys that are talking, and it is always about work. Like currently we're experiencing teething problems, every 5 minutes we have a meeting, I'm so tired already, to say how to prevent it. ERP is a curious thing; ERP is used to make forecasts and if the forecast is not correct, then your Master Scheduling is not done correctly and your purchases can not be done, and everything… so there's an absolute interaction between them, and if you experience teething problems, the system tells you need to manufacture this thing tomorrow, but now you enter that you require a 20 day lead time, and then it tells you that you cannot manufacture it tomorrow, but only about 20 days' time. So it's all informal and formal, we have many meetings how to set things right.
I.47	MC	And if we consider the other items on the list, including encouraging experienced employees to interact with new or less experienced employees?
I.48	Frank	No, it is operational and it is absolutely… you know it's a resource thing. You don't have 20 people, you only have one guy that can do the work.
I.49	MC	And offering off-site training to develop skills?
I.50	Frank	Yes, we are part of the xxx Group, and they absolutely ... ... all the time. Customer satisfaction training, all those things, all the time. And we pay a management fee each month for that. So we use it all. And then of course you get your SETA rebates.
I.51	MC	If we just can just quickly look at how you view knowledge. If we look at tacit knowledge - the experience, skills and know-how; the knowledge that people have in their heads that you cannot really capture, how important is that to your company?
I.52	Frank	At present we do not have a database for that. We do have a lessons learnt database. It's one of the components of the system; you should be able to show what experience you have gained based on what you have learnt. Then what we do a lot … we encourage …there's no …I think there are a few sites that are 'banned'. We don't, for example, want them to look at KFM all day; but the Internet is an absolute… We do not prohibit its use. We probably are one of the companies that use it the most. So if you are on the Internet, trying to do your work it's fine. You cannot sit all day and check out the shares; that you may not do. You still have to do your work. And what we use a lot - have a database or an area where, as you find something that has to do with technical issues, or development, or patents, we are very much in to patents, which you can use, then we have a database of Internet links; that immediately can say … you can actually say specifically which company, let's say nylon brackets, and then there are an awful lot of Internet links that the guys have found over the years and then they put it in the database.
I.53	MC	And do you have measures in place to see whether people are using it actively?
I.54	Frank	Oh yes, we have a logging system. At any time you can access it and see how many people have used which database when. And not so much … it's mostly between me and the IT manager where we will be able to see… is this database used; is this field used? Why is it not used? Very few people know of the logging system. They don't really need to.
I.55	MC	Then, looking at the outcomes of activities within the company, you have indicated: "The outcome of activities in the organisation is fairly predictable", as opposed to Highly uncertain and 100% Certain. What do you have in place? Why it is fairly predictable?
I.56	Frank	I think it's when you access the database, you will immediately get access to the views that you can view. So it's predictable in terms of what you can see. And every person in the company has the facility to view each area, to look at every program or all database fields and linkages; and if I need something that is not in any of the existing fields, I can develop personal views, so I can do it. Because it all is menu-driven and view-driven.
I.57	MC	And if a customer approaches you with a concept about what they want, can you be pretty confident about what the outcome of what you need to do will be?
I.58	Frank	Oh no, not necessarily. It is then that you use the Internet literature … where you go ... because our work is chemically-driven. Many of our people on the technical side have a Master degree in Chemistry and there is one Doctoral degree. They know where to search and how the development will work. Thus it can be Unpredictable in the sense that they

		say now I need to make a cup from plastic, now I do not know where I am going to get plastic, then he will find out what are the characteristics of the cup, may it be in the sun, may it not be in the sun, and then he develops the product with the customer, and then test it.
I.59	MC	In terms of the people who have completed the survey, how are they distributed in the different areas of the company?
I.60	Frank	Incidentally I had a look at the groups, and it was interesting to me that the guys who know about the database and have knowledge of IT, were all on the one side; again on the other hand, something doesn't make sense to me. The bunch of production people… because on the production side you make a product and that's it; the guy isn't really bothered with what is happening on the other side of the company; and there is one person, and it is the MD, in that group and I could just not understand … then I remember that he basically just sits… he manages here from above. We have always said, the further he stays away from a computer the better for us.
I.61	MC	But this group of people is spread among different clusters.
I.62	Frank	Just by lookin at the names, I can tell you why this is so. Xxx is in our Sales division, he provides reasonable inputs and he knows what it is. XXX, he's been here a year, he is more computer literate - he knows what it is, he understands the system, he's our Buyer. He knows exactly what it is. That guy, I have tried to work out why he was in this group and this is our old accountant, he knows exactly what it is all about, and XXX is our IT manager. Then we turn to this guy. He has "tunnel vision". Why he should do it – he has no idea what it is about; and this one is our Quality Manager. He only does quality. The lady I was actually quite shocked in that she is our technical manager, and she is supposed to be in this group, but she has not been here long here, so…
I.63	MC	Let me just quickly explain. There were four clusters. And these people are not all in the same group. So they were scattered over the other three clusters. So she was probably in a different cluster than you were, but not necessarily too far removed.
I.64	Frank	What might have happened is, she comes from XXX Polymers, and perhaps because they have terrific KM, she maybe feels we're not there 100% yet. The person is also a problem. She is our product manager. XXX, I could not understand. XXX is the guy that sent you the e-mail. He's a production guy. He's a cynical man. But these two I could not understand.
I.65	MC	If we turn to the predictability of your day-to-day interactions with your clients.
I.66	Frank	You see our production is not ... okay it is customer driven, but it is more product driven. Because you create a product based on a forecast, you will sell, so you often use statistical methods to make projections about what will sell at what time and where. So yes and no, you have a lot of customers that you know are going to buy, but now you have time, for example we are now, we can already forecast that our developments next year will earn us an additional R9m, and the years thereafter it should be an extra R50m. So you do your product life-cycles, and you work out which product is declining, and so on.
I.67	MC	And if we look at the methods you use?
I.68	Frank	Yes, you have the MRP, Bill of Materials, with the components for producing each product. So you know exactly what you need, you know exactly what you are going to make. And it also depends on the development of that product. Thus every new product is produced in a different manner.
I.69	MC	If we look at the workflow within the company, you have indicated that work flows in a back-and-forth manner.
I.70	Frank	Back-and-forth. Absolutely. This is the ERP system; In fact, I'm now working on compiling the matrix for the new system, to say who's outputs becomes who's inputs. The process. We have developed 13 processes in our company – I'm talking about the management-orientated processes. It is about things such as strategic planning, maintenance and quality systems. Then you talk about customer-orientated processes, beginning with sales, ERP , manufacturing, dispatch, and then you have service-oriented processes; Those are the three groups and it is for example your administration, your maintenance, your provision and management of people. You provide the people, you maintain it, and so on. And there's absolutely integration between all three, between the processes.
I.71	MC	If we look at the role of knowledge, you have indicated, improving processes is a significant contributor to our organisation's ability to compete. " Why would you say is true?
I.72	Frank	It's about Sustainability. It's all about survival here. You need it, I see it every day. Every year we do what we call a risk analysis of the company. Strategic risk analysis, where you go through a process of brainstorming ... you say what is our risk? Whether HIV Aids, and so we go every year and say this is our big risks and you cluster them. Where you identify 5 or 6 risks; we go away for 2 or 3 days, and just focus on strategic risks And then you go and you say okay how do you manage this risk? What are your action plans; When will it be done. We do this every year. So our strategic planning is done now to 2010. So we work on a 4/5-year projection. But every year, you adjust a little to.
I.73	MC	And if you look at your processes as indicated in the question?
I.74	Frank	Processes in terms of managing the process, absolutely. The first thing you see in our brochure is continuous improvement. We call ourselves a custom compounding company. So you absolutely have to improve constantly.
I.75	MC	If we now consider the coordination of KM activities within the company. You have indicated that no formal coordination processes are used, and that it is unstructured. The one which has been indicated as being formal, is making knowledge accessible to those that need it.
I.76	Frank	Yes, it is via the database. And the first thing you ask yourself is, what I am making available now, will everyone be able to see it? If everyone cannot see it, then we use a notice board, and meetings where people are informed and told about the latest trends. And we go through a training programme to keep everyone informed about important things.
I.77	MC	So processes were rated as being more unstructured, for example indicating the direction in which knowledge should be developed, the management of knowledge and filtering knowledge..
I.78	Frank	Absolutely yes. This is perhaps one of the following objectives, to keep this thing structured. Where you say once a year I do a survey, once a year I do it, and once a year I do

		it.Thus it is quite unstructured.
I.79	MC	Then if we look at how you are using knowledge. The processes were usually unstructured, except for using knowledge in the development of new products or services', and using knowledge to solve new problems ", which were both indicated as being formal processes. Why would you say is this true?
I.80	Frank	We have the logging systems. So you've got a log book for every thing. But if you have a problem you can ... we do not have a system for it.
I.81	MC	Yes, because I saw in your response all were marked as unstructured.
I.82	Frank	Yes.
I.83	MC	Good. Next knowledge creation looks at how knowledge is created in the company. Again largely unstructured, except for 'acquiring knowledge about our customers', and 'acquiring knowledge about our competitors'. Why would you say this is true?
I.84	Frank	What we do is we have what we call 'visit reports. Each visit report is structured. The guy has to say why he made the visit: who is the competition working in this area? How much did they sell? Who is the seller? What is the selling price … so basically you have a whole database. If I look in the database, I know exactly who the competitors are that are selling there. How much do they sell? Where do they sell?
I.85	MC	The last question looked at how knowledge is integrated into the company. Again largely unstructured, except for Distributing knowledge throughout the organisation, which you indicated is a formal process.
I.86	Frank	Yes, it refers to the database and the e-mail system. Thank you - if we can learn anything - any time.

Focus Group Session

Ref.	Speaker	Content
1	MC	You indicated in the survey that the company does have formal KM Strategy. Why would you say that?
2	Al	In terms of when I look at ... a lot of the things in our business is accumulated by individuals; the knowledge is accumulated by individuals. We have got a lot of information and because it is accumulated by certain individuals, PolyChem had gone a step further of creating these databases where that information gets logged on. That information becomes available to everyone so that the knowledge is basically passed on to everyone.
3	Al	Via e-mail from Frank, everything channels from Frank who's our Systems and Training manager; but every new database that's created is communicated to all parties with a list of instructions on how to access it and what to look for and you would have guys with primary input into that database which is the guys with the knowledge.
4	MC	How is this strategy typically communicated to people?
5	MC	And if a new person starts working at the company?
6	Al	There is an induction programme where everybody is taken through the various databases and the databases applicable to their jobs, and the stock standard databases like health and safety, and ... what's the other ones?
7	Trent	The document database with all the rules ...
8	Al	Ja, the document database with all the rules and procedures and stuff. Every new person that comes on board is taken through that.
9	MC	Did you want to add anything Trent?
10	Trent	No, we do have the databases with all the rules and policies and procedures. And also to be an ISO company there are certain logical steps that need to be in place to be ISO.
11	Al	A lot of it has also got to do with the fact that knowledge is being passed on to various staff, it's not just like you'll find some guy that accumulate vast amounts of knowledge about the products of the company, our clients and competitors etcettera, and that knowledge is not passed on to someone else. That knowledge is actually passed on to the next person.
12	MC	You indicated in the survey what the focus of the KM strategy is central to the company's business strategy. Why wold you say that?
13	Trent	Because we specialise, we focus our technology around what we do. And from there we filter it out to our customers. It's part of how we work.
14	MC	As far as expected benefits from KM are concerned, you all indicated that better decision making is an expected benefit. Why would you day that?
15	Al	From a management perspective if you were to go into any negotiations to do anything, or if you're faced with a strategic decision you have to make, if you only have 10% of the knowledge that's available at your disposal, it will be difficult to make any decisions; where if you have the information available at your finger tips, it's much easier to assess and you don't have to guess in terms of what decision to take, because you'll work from the facts rather than a thumbsuck or a wish basically.
16	MC	Touching on that, is there a way that the quality of the information in the database is monitored or updated, so that people know this is the latest information? And that it doesn't get outdated over time?

17	Trent	There is a form in place with an expiry date, and there are document owners that own the documents and have to actually e-mail the people to say the document has been updated.
18	Al	The newer version will be e-mailed or an e-mail will be sent to all the parties concerned.
19	MC	In terms of structure, you indicated that there is a formal knowledge management function. Why would you say that?
20	Al	I'd say we look at Frank to basically fulfill that role. As the Systems and Training manager he's not only concerned with the training of staff for example for job betterment, but he's also concerned with the spreading of knowledge; and he facilitates the coordinates of all functions that come from these databases. In most cases he actually sets out databases; he designs databases; and he's the one that actually acts as that link between the databases and the users and obviously checks that changes are communicated to all parties as well. So everything is routed through Frank; and into the database and from the database through Frank to the users.
21	MC	If we go a step further if you look within the business units, you all indicated that there are designated roles within the business units to encourage the knowledge sharing and knowledge use. Can you explain perhaps by using an example?
22	Trent	Ja, I think also it depends on your level; we all have a good idea in our business areas of what's going on; and to see where the company is going and what it is doing. I suppose at a lower level people will perhaps look at it differently.
23	MC	Does that mean there isn't someone with the responsibility at a lower level to also follow-up on how knowledge is shared? Is it each business area's responsibility?
24	Trent	Ja, you do get assignments and things like that in the database, a manager can assign tasks to people and follow up, and give feedback.
25	Al	But I think it's also open; the use of the database is not restricted to certain individuals, its open, you know anybody in the company can go and log a customer complaint; anybody can go and log a report, maybe they had a discussion with somebody around something pertaining to the business; that might impact on the business; and that person can actually go and log that discussion they've had; and it becomes visible to everyone because it gets logged into the database; so I agree with Trent that from a management perspective we do have the opportunity to subdelegate that functions of recording of the database and management of the database to lower level staff. But you know we also have a dedicated person on the floor level that come up and say I've checked this, that and that. It will be a general view you'll see through out the organisation.
26	MC	The survey indicated that the technology that is used in PolyChem supports KM. From your perspectives, how do you see the technology supporting KM in the company?
27	Al	If you look at our databases, you'd have a database of virtually everything. About your competitors you'd have a database; for someone coming into the business, or even existing person in the business moving up in the business, if I were to join the sales team, I wouldn't necessarily have to then depend on the current sales team to show me the ropes; By accessing certain databases I can familiarise myself with the clientele, with the competitors, the type of products that the competitors are selling; and even go a step further and familiarise myself fully and technically on the products that we sell and the formulations of these products as well, and also competitive versions of our products that our competitors out there are selling so in that sense the technology structure that we have in place can actually pass on that knowledge without the interaction with our staff. So the driver of our knowledge is actually our technology itself. The databases itself, if you look at it in that way.
28	MC	And in terms of the technology you use, are there areas where you feel it can be improved?
29	Al	Definitely. I think our databases can be updated more frequently. There are certain databases that I feel; again it depends on who you speak to, from my perspective there are certain databases that have fallen by the way-side; but I find that our competitor databases are out of date, but again it's because I'm new to the business. If you were to ask somebody else that also run with knowledge in their head, they're not to concerned about the database, and they will go and add in there whenever they have time available. But it's more an internal thing. It's more a cleaning up of the database or re-looking at it, re-activating certain aspects of the database.
30	MC	You all indicated that you do not have a dedicated budget for KM activities. Why do you think that's the case?
31	Al	It's more an ad-hoc thing, it's not a fixed function. Even though Frank is our Systems and Training manager, facilitating all these things, there isn't a set structure surrounding it, like you have to go and do this here and you have to go and do that there; It's not so much a rule but within the company it is expected that people will pass on knowledge. And in that sense it is not budgeted for, other than training, it's not budgeted for. You don't budget for adding on to the database.
32	MC	Then in terms of incentives and mechanisms to encourage people to use knowledge and to share knowledge, you all indicated that there aren't any mechanisms in place. Why is that the case?
33	Trent	I think there are mechanisms that could be put in place. They say knowledge is power. The difficulty is how do you encourage some people?
34	Al	You look at it and you have to assess it, do you really want to expand your knowledge? And you know some guys would find that almost...
35	Trent	…freely give it out and others that will hold it because they feel threatened.
36	Al	Ja. You will find guys that actually go and sift through knowledge that is not related ot their current function but also to better their knowledge about the company itself. And in that way will also grow with the business. And others will purely look at it as a 9-to-5 job. I come in; I go home; I get paid and that's all I want out of it. So if you incentivise it you're running the risk of everybody just dumping a whole lot of crap in there.
37	Trent	Ja, that's the other question. Who audits it if you do do that?
38	MC	From your experience, do people share information freely?
39	Al	It depends on who you deal with. Like Trent said some people will just generally give it all and feel that it would better the work environment; some people will just generally not share it because they feel threatened teaching somebody else. In general I would say about 70% of our guys are fairly open when it comes to sharing and disussing ideas,

		and changing ideas as well.
40	MC	Touching on that is the learning culture within the company. Whether people are encouraged to explore and experiment; encouraged to ask others for assistance when needed; encouraging employees to discuss their work with people in other teams; then more formally mentoring practices or apprenticeships; arranging for employees to interact with new or less experienced employees; off-site training; and arranging for employees to participate in project teams with external experts.
41	Al	To answer some of that. External project teams - we do get invovled with outside parties. That's on the more technical side, especially for the type of business that we're running. It will be more on the technical and marketing side for new product development etc. etc. Internally we do encourage staff that has been here for many years and gained a lot of knowledge to take under their wing the guys that are just starting out; We do encourage staff to flag their problems which they do freely; we do encourage guys to flag certain things that they need discussion on; we also do encourage guys to speak about their current positions to see how they interact with other areas.
42	Trent	And there is mentoring, but it's more at you lower levels.
43	Al	There are no set structures around it though.
44	Trent	The structures are there from a manufacturing point of view; but on the administration side its not.
45	Al	On the administration side its more issue comes up, we look at it, we discuss it, we try to encourage our guys to..we try to show them how to do it; but I think we don't go that whole nine yards that you would expect to go if can't solve or whatever you get somebody from the outside in.
46	MC	Now let's look at how the organisation views knowledge. We've talked a lot about the knowledge that is captured in the databases. When we look at tacit knowledge, the knowledge a person has in his head, skills, experience, know how; what mechanisms do you have in place to share that within the organisation?
47	Al	That's more unstructured and it's depending on the individual. There are no set rules that you got to pass on skills that you think is necessary to another person.
48	Trent	One of the downfalls of PolyChem is we do a lot of multi-tasking; you're not isolated to one particular job, you have spread duties. To focus your attention on one, you're neglecting your other responsibilities. It's very difficult in that respect.
49	MC	In terms of the type of activities that you do on a day to day basis within the company, you indicated that the outcome of activities is fairly predictable. As opposed to being highly uncertain or 100% certain. Why would you say is that the case?
50	Trent	In general we all know what the roles are that we play in the company; and if those descriptions are fulfilled then it is quite predictable what the outcome will be.
51	Al	And we have processes in place as well.
52	Trent	Ja, all the policies and procedures.
53	MC	And if we look at the work you do today and the work you'll do tomorrow, is that fairly similar or is there a lot of variability?
54	Al	That depends. Like Trent said, you don't have anyone of the management team that basically has that clear cut function that he can concentrate on only one thing. He's got a vast amount of responsibilities and he sits on various structures where he's got to report back on, some of it may be way outside of his scope, but because his got a bit of knowledge ... it depends on who you ask. The guys on the floor, they would basically be the same everday. If you were to ask some of the operational managers, in terms of what type of work they do every single day, it's virtually the same; from my own perspective the day can change with every moment.
55	Trent	It also depends on what level and how you look at it. From the top level if you look down, they all know more or less what you're going to do; but if you look at the individual in more detail, then it can ge a bit hectic in that respect.
56	MC	So would you say the work is fairly variable in that sense?
57	Al	Yes.
58	Trent	Yes.
59	MC	And then in terms of the methods that you use on a day to day basis to do your job. The survey showed that [list option].
60	Al	It's more or less the same because of the processes we have in place.
61	MC	Then if you look at how work flows within the company, there were a few options. Once was people work independently and work doesn't flow between them; Work flows between people but only in one direction; The one that you all selected was that work flows in a back-and-forth manner, and the final option was that people work together at the same time (collaboratievly) to do the job. Why would you say is that the case?
62	Trent	Just again I think because we've got procedures in place, there are steps that you follow, and certain things that need to be completed for you to be able to carry on with your work; like I do T190's for argument sake, I need certain information at a certain point, I get to a point and I stop because I need to get information from someone else before I can go further.
63	MC	And do people generally know who to ask?
64	Trent	Ja.
65	Al	Generally;
66	MC	How do they know?
67	Al	uhm [thinking]
68	Trent	Because we're a small staff;

69	Al	It's like Trent said you know, Trent is the IT manager but Trent probably sits in on production issues; he sits in on warehouse issues; on inventory issues; is there anything else we don't sit in on nowdays? So it's not documented but you come to recognise certain people with certain skills they have. And they get contacted if there are certain situations or certain issues, so and the guy on the floor sees it, so he knows that if he's got a certain problem, if he's got an IT problem, he might not necessarily contact Trent he might contact somebody else that he sees also as having a little bit of IT skill and knowledge that he can actually milk from. So on paper we've got clearcut jobs, clear positions, but on practice guys do have additional skills.
70	MC	And the research and development area?
71	Al	From a research and development point of view I think our guys are capable to do formulations, but if they do get stuck they've got not just suppliers but they also have technology partners, a lot of our suppliers are in fact our technology partners as well, but we also have the registered technology partners as well, and they work with other institutions that the guys formally utilise to assist with certain issues, like laboratories, universities etc.
72	MC	In terms of the role of knowledge, the survey indicated that improving processes is a significant contributor to your organisation's ability to compete. So using knowledge to improve processes. Why would you say is that the case?
73	Trent	You need to know what's happening outside in the real world, to stay abreast with what's happening you need to be competitive. Because if you're not.
74	MC	But why is using knowledge to improve your processes so important?
75	Al	We're a manufacturing concern, so obviously our core focus will always be on processes, unlike a trader. So everybit of knowledge that we gain from our technology partners, we then apply back into our processes and as Trent says, when our guys go out there, generally we go and look at processes that are similar to ours. And new developments on those processes that we could possibly do in-house, to further improve our processes, and in that way obviously become a bit more competitive and a bit more profitable.
76	Trent	And also to make sure of what's happening outside, that we're going in the right direction.
77	MC	And is it somebody's job to specifically go and look outside?
78	Al	Not specific, but in general we have got Charles, our Sales Manager, he'll go out to clients and to competitors as well that he knows of, our account managers, our Marketing Director, our Technical Manager; and you'll also find our development guys like Heinrich and those guys, who frequently go out and see what they're doing and what we're doing, and where maybe have fallen by the wayside that we can actually improve our process to better serve our clients then.
79	MC	And with all this input, how is the decision made about what should be improved?
80	Trent	Well, it does go into the database. It does get logged. And I think after you pick-up a trend to say okay we've fallen by the wayside in changing things, and then what you do is we'll have strategic meeting to discuss it and realise our goal.
81	MC	The last four questions look at knowledge processes. In terms of the coordination of knowledge activities, you indicated that [list options] are largely unstructured. You indicated however that making knowledge accessible to those that need is a formal process. Why is that the case?
82	Al	For most part it will depend on the individual, in this case predominantly on the manager. Or the area manager. How they will actually go about; if they have the time available to actually go and do it. There is no formal structure surrounding or rules surrounding how it should be done. I think it again is on an ad hoc basis and person-dependent. Some managers would go and frequently review staff requirements, and knowledge requirements of staff in terms of where the company is heading, and then try and get the guys to go on some course or training courses basically to develop their skills. Some managers wouldn't see the need for that. But there is no structure to it. No structure to it. There are some formal policies around external courses and bettering one self etc. etc. but there is no clear cut policy around who's performs the function and how the function is performed.
83	MC	And when you look for example at 'providing feedback on knowledge initiatives', do people in the company ever receive feedback on benefits that materialised from using the database or other benefits to the company?
84	Al	People will talk to one another, on our own, probably go to Trent and say I like the database its cool, but that's about as far as it would go. It won't be documented or circulated to all the departments.
85	MC	And in terms of knowledge usage, you indicated that the activities are largely unstructured, except for using knowledge in the development of new products or services; and using knowledge to solve new problems. Why do you say knowledge is used to develop a new product or service?
86	Al	Well we've got a technical request service database. So our guy goes out there, a sales guy goes out there and he comes across a product that he feels might be of interest. He goes and log onto our development database and he goes and create a request for that. So through the database he goes and request development. And in that thing he would log any additional information, he would log in potential sales volume, potential sales value; so he goes through the full project assessment stage, then he goes and logs all the details pertaining to that project; the project gets a number, the Marketing and Service Director views it, she attach a number from 1 to 6 I think, and then as the project moves through the various phases, the number status will change, then when it reaches a certain number, in the commercialisation stage, and then either a formal or very informal product lauch will take place.
87	Trent	to see whether other people around have done the same things, do we go and partner with that customer.
88	MC	And in terms of doing that feasibility study, where does the bulk of information come from?
89	Trent	That part I don't know.

90	Al	To a certain degree yes. I'd say a lot of the standard details go in there, things like anticipated first segmentary sales, current market scope for this product.
91	Al	He goes out there, be it a sales guy being out on the road, coming across a product that he thinks will be of interest; or that are given unto us through our technological partners, or through a client. And then the guy who then picks up that lead would go and do outside reseach and that person would then go and speak to various people out in the industry or go on the Internet and basically that person will do a little research and then pop all that back into the database and then on a much higher level that detail is looked at and a decision then gets taken you know is it feasible to go and develop or do we need to partner with somebody to do this.
92	MC	But that's information that goes into the database. Where does the person that puts it in there obtain it from?
93	Trent	The detail gets sent to one individual who controls all of that. So they've got the knowledge of who does what in the market.
94	Al	Yes, and informally you'll also find guys saying in the database just be aware of this, there's a new link to a webpage of something to do with our industry. It gets send out to everyone. It might not concern you or your area, but that information might become helpful for something else.
95	MC	Is there a good search function across all these databases?
96	Al	Yes.
97	Trent	Yes.
98	MC	In terms of creating new knowledge, we just touched on that. Once again the activities rated as largely unstructured, except for 'acquiring knowledge about our customers' and 'about our competitors', which were rated as formal processes. Why is that the case?
99	Al	It's the sales people and you know there's also a customer database where guys can log anything to do with customers. If a sales guy goes to a meeting with a client it gets logged in there, when you come across a potential new client it gets logged as well as a prospective client; you will find that non-sales staff would come across certain things in the market place for the areas that they deal in, and they will also forward it on to the sales guy who'll put it in the customer database.
100	MC	Just another question on that, the technology that you use for the database, is that mainly Lotus Notes, or is it integrated with other software as well?
101	Trent	We solely used Lotus Notes in the past, but now we have a new system which is integrated across. And the idea is to phase Lotus Notes out and use one technology for a portal.
102	Al	Some of it, the majority of it will go across.
103	Trent	Because we now have a CRM technology, the majority will go across to Microsoft Dynamix AX. The formal policy and procedures will still stay in Lotus Notes.
104	Al	All the customer-related stuff will go in to AX.
105	Trent	Document handling, data sheets, and that.
106	MC	The final question looks at how knowledge is integrated into the organisation. You indicated that [list items] are largely unstructured. 'Distributing knowledge throughout the organisation' was rated as a formal process. Why is that the case?
107	Trent	That refers to the database. It's once again up to the individual - how much do they want to know.

APPENDIX G
FOURIER APPROACH TRANSCRIPTIONS

Translated interview with Managing Director

Ref.	Speaker	Content
I.1	MC	First a few background questions. How many people are employed by Fourier?
I.2	MD	We have two companies in the group, let's call it a group. It's not really a group of companies, but rather two separate entities, but we are totalling 52.
I.3	MC	If you can provide me with a bit of background; Am I right when I say you are in the IT Professional Services industry?
I.4	MD	Yes, we have two legs. And the one leg is taking the backseat at the moment, which we hope to change this year. Our industrial engineering work. Our business analysts are mostly industrial engineers. And then there is the systems analyst side, so that we have two main lines of business. That is how we earn our income. Coincidentally it happens that we do a lot of systems-related work. Even though we focus on something like industrial engineering, much of the work we do is process automation or performance evaluation, performance measurement, systems ... the foundations are in systems and so we actually do a lot of information systems work. So it's a mixture, between information system consulting work and industrial engineers consulting.
I.5	MC	And if you look at the environment in which you operate, what would you say are the 'drivers of change', what is it that you should watch out for in terms of industry changes, that may have a direct impact on in terms of how you manage the business?
I.6	MD	I think that technology definitely is one. For example, at some point we had to make a decision whether we are going to develop our expertise in open source, or more the Microsoft type … and we decided we are not going to do the open source thing, for a number of reasons, whatever the reasons may be. So technology definitely is a driver. And I think market expertise. Industrial engineering probably is a good example where a shortage of expertise exists ... and that's why we think industrial engineering as a consultation service will sell better now than, for example, three years ago. So the market forces inside and the availability of skilled resources is an important one, technology is an important one and the availability of resources for us is an important one. It's a nightmare to find new people. Engineers – it's still relatively easy to find IT guys. We cannot find industrial engineers. We wanted two appoint two graduates, and we could not find anyone. We lost two guys. One went to New Zealand, and the other one went to Australia – both industrial engineers.
I.7	MC	And the nature of competition in this niche market where you have to compete?
I.8	MD	You know, the information system stuff is very broad, every second guy and his partner claim they're doing it. Who is your competition? You can say Accenture is your competition because they do it or you can say the guy here on the corner is your competition because he also does it, so it is a bit difficult. What one needs to do is one should try to distinguish oneself, and we like to think of our methodology in terms of differentiation. And it is only one component of knowledge management, it is actually an institutionalised experience, the methodology of what we do, how we develop, how we design systems, how we formalise it, how we deliver it. That is the stuff I think we are taking to the market successfully, and we have a track record and we believe it's because of that. At the engineering side it is more a niche market, I think. There are only a few industrial engineers consulting firms, they are out there ... and one competes with them.
I.9	MC	This corresponds to the following question. What are your critical contributors to success? What is it that will distinguish you from other companies in the same industry?
I.10	MD	I think once again methodology – the way we do things. We can, with great confidence, tell customers exactly how we are doing things. And customers like it, and customers return because of that. Usually our customers are more long term. It's not that we do something quickly and then go away; We have customers who are already ten years with us. That's wonderful. They are not necessarily large customers, but they return again and again and if one gets business for one hundred or two hundred thousand Rand a year with that client, it is significant business.
I.11	MC	The next set of questions will specifically look at how the questions of the KM Survey were answered; Specifically to understand why, what are the reasons behind it within the company. First, throughout everyone within your cluster indicated that the company has a KM strategy, so I accept you have a formal knowledge management strategy. What I want to know is what made you decide in the first place to implement a formal strategy?
I.12	MD	I think from the beginning, we said our company is not a body shop. You know, the moment that you say you are a body shop, the expertise comes and goes with the body. Then the experience is linked to the body, and you look for such a body, and if he is gone he's gone, then you try to find another one. We never were a body shop and the moment that you're not a body shop, then say that the expertise should really reside in the company, and whether the guys are coming or going shouldn't matter. The expertise should be in the company. And that's where it came from. So if we say we focus on something like Business Intelligence, we need Business Intelligence as a formalised field of expertise, and it means we have to say what we do, how we do it, who are the people that have the experience and so on. So that is where it came from and we have started, we have tried a number of ways … let me tell you it's not easy … a number ways to try to structure it like I said, to try and make it part of the institution, to make it part of the company value. We have already managed it as part of a staff function across the functions, we have already started managing it as projects, we still manage it as projects. Where we say we have a technical area, in that technical area, we formalise expertise and there is a repository for it, so any guy who would like to read something can have a look there, and that is basically the knowledgebase. That's what it really is. But it does not happen spontaneously; it's like a wheelbarrow, that you must keep pushing, and the moment that the guys work or projects and bring in money, those are the things that suffer, so it remains a struggle.
I.13	MC	And is your strategy documented in terms of what you want to achieve so, or is it merely principles that you strive to achieve?
I.14	MD	It's more a principle than a formal strategy. I do not have a strategy document that says this is our knowledge management strategy. Quality management supports it; we do have a quality

		policy and a quality manual, we've been through that round; we have never been ISO accredited, but we went to a lot of trouble with it. Within our repository we have design documents, and our value chain is presented there and we know what we do there. Thus it supports the principle of providing the basis for this to grow. But I do not have a document that says here is our KM strategy.
I.15	MC	And in terms of the focus of your KM strategy, you stated "Knowledge is central to our business strategy" so when we look at the reasons why knowledge is embedded within your business strategy?
I.16	MD	I cannot really tell you. We have not really weighed the different options. We decided this is what we want to do. So it's not even that we thought of the other options. We try to think longer term. If you constantly change, now we do this, now we do that, then you lose all that. We try to break the rock.
I.17	MC	The rest of the company had very different opinions on what the focus of the KM strategy is, as some people thought it focused on innovation, and others thought it focused on customer knowledge, or transfer of knowledge and best practices. Why do you think are there so many different opinions about what the focus is?
I.18	MD	Maybe it's just that the communication about it is not well focused. The other reason is we are a project-driven organisation, so is a guy works on a long-term contract on a project as a customer, then he becomes customer-focused. Sometimes we are struggling with that; a person may be working at a specific client close to a year and a half, and then start wondering who he actually works for; and then he starts to become customer-focused, and all his information is the clients' information - the project-type domain information. So that's probably why the guys have reasoned that way. The best practice stuff is in line with the methodology stuff, so for me that's more or less correct. We also use the tool to make innovation ideas visible, because I tell to them go there and register new ideas.
I.19	MC	In terms of the expected benefits, there were three with the same score: Increased productivity, better response times and reduced cost. Why do you think those are the benefits of KM that you can obtain and then how can KM support you to achieve the benefits?
I.20	MD	Look that is the theory. That's what a guy would like to see; and one would like to go and say we want to do a proposal for mine logistics simulation work. Now we are looking at all the projects, it's like the big consulting firms work. They look around the world where such proposals have been made, and then cut and paste them and write a new one. And that's the theory, and we are still too small, I believe, to do it properly. And a lot of it resides in the guys' heads. This morning again a tender was put out for simulation work; and you quickly call the one or two guys who really are the experts and we quickly wrote the tender. So it is not necessarily in the knowledge base for proposals, and cut and paste and make it look nice. So the theory is that a one does that; but it also gives you the longer-term expertise in the area. If maybe you lose the person who is the real specialist, then someone else can go there and look.
I.21	MC	If we now look at the structures around KM; The survey indicated there are different opinions about whether you have a KM function or not. You have indicated you have a formal function, why do you think different opinions exist?
I.22	MD	I think we don't really have a knowledge management function. If one say a 'formal function' then there typically is someone with a specific role; someone in a management function, and we wear many hats. The knowledge management function actually resides with me, just like quality management and HR; and one starts wearing many hats and I think I said there is such a function because the responsibility exists; but it's not necessarily indicated in the organisation chart that there is a thing such as KM, and that's probably why guys say that. But there is not anything. In my mind I have no doubt that it exists. We just wear many different hats and then one starts to prioritise and then one guy says listen, it is more important to do the marketing well.
I.23	MC	A question that builds on that. Do you have designated roles within business units to encourage knowledge sharing and knowledge use?
I.24	MC	Again it is different hats. Basically it's a guy that is a line manager who must also make sure that some of the information ends up in the repository. Then there are project managers, guys that actually are business analysts, but now he is a project manager, so he must ensure that the project deliverables also go there. And they know they should do it. It is part of the methodology. And at the end of a project we check to see, when we finalise the project, we do a check, are there deliverables, is the software within the configuration system and have all the design documentation been logged, etc. So yes, there definitely are such measurement points.
I.25		Good, when we look at technology. Again, within the company there are different opinions about whether the technology you use actually supports KM. You have indicated the technology supports KM.
I.26	MD	I think so. (Laughing)
I.27	MC	Well if you have a knowledge base, it at least makes a contribution.
I.28	MD	But how structured should it be? (Laughing)
I.29	MC	So why did you decide to take the route of implementing a knowledge base? Or to implement a technological solution for to support your knowledge management?
I.30	MD	Look, we did not have a very structured evaluation process along the lines of now we need it, and now we look for something in the market; now we buy something, etc. Years ago we started using Microsoft Sharepoint portal as a way of sharing information; The only other option is to create a directory structure somewhere on a server to, where certain people have access or don't have access. Basically that is what the portal is, just with a nicer, easily accessible interface. And that is basically where it came from, to share information. And that's basically what it is. So I cannot really say we went through a very structured process. We have gone through a process to try to structure it better; to see how we can let thus stuff make more sense. We had many arguments about how structured or unstructured it needs to be; And then the technology also had its fair share of pains. You know the Microsoft Sharepoint Portal. March 1, we'll be going live with the new Sharepoint Portal, but the old thing, oh no, we struggled a lot to make it work; with access problems etc. I'm really looking forward to the new system; I think at least it's an improvement already. The old system really was well was horrible.
I.31	MC	If you can just briefly explain how the knowledge base is currently being used?

I.32	MD	Well, once again, there's reality and there's the theory. Let's start with the theory. The theory is that we have general company information, which the company described as the policies and procedures and stuff. The data dictionary, where we generate document numbers, where people ask for more information about it, actually metadata type information, it is all there, there is good social information, photos of business functions, such as it business-related property, templates of documents; a template for proposals, those kind of things are there. Then there is an area where all project information is situated. And that ... maybe I should first say there's an area where all the marketing lies. So this is where the marketing function's repository for all the proposals coming out, so you have clear definition, you can always go back there and go get that proposal as the contract is placed and you can then make the match. And then there's the actual knowledge base we store discipline-related information, e.g. if we say our business focuses on something like Workflow, there is a place where all workflow-related information is stored, and it is the technical … we call them technical wheels, because it is a thing that says you have an area that is methodology, you have an area for tools, you have an area for training, you have an area for deliverables. It's a thing with spokes, and we call them technical wheels and we have created such areas for it. So it is almost like a library of information about a specific area that is in there. And then the part that is most actively used is actually the real project repository; So if we have a project for a client we will create automatic, not automatic, it was so, it broke, then we go and we create an area, we create that place on the project portal, and all project documentation is in there. That's the theory. Now you must go and enforce it to make sure this happens, it doesn't always happen; We sometimes find that if we want to follow-up on a project, and we look for the information, it is stored somewhere on someone's PC and then you go looking for it. So it's something of a control thing one must hammer into the guys' heads.
I.33	MC	Good. You have indicated that you do not have a dedicated budget for KM activities, and also that don't anticipate having one in the next 24 months?
I.34	MD	Let me explain why. One reason, we see it is inherently part of our project methodology and management methodologies, as the guy who is responsible for a technical area, it is his responsibility to put it in; the guy who is responsible for general management is responsible for the function management. The software we use we don't have to buy, because we are a Microsoft Gold Partner so we get it for free. That's the reason why we do not have a budget.
I.35	MC	HRM Practices… here we are specifically looking at mechanisms to encourage people to share knowledge create new knowledge. And your survey has indicated knowledge usage is considered during appraisal interviews and salary negotiations.
I.36	MD	See it's a way we try to create the incentive. I told the line managers, listen, as part of your appraisal I want questions like "is the guy's stuff here; does he use the portal; and did he store his information here as he completed the work; and if he isn't doing it, then he gets knocked about it. It's just a way to try to encourage it.
I.37	MC	Next is the Knowledge Culture. There are different activities that one can perform to create a culture of learning and sharing of knowledge. And it can be divided between informal practices and formal practices. The informal practice focuses much on encouragement, such as "encouraging employees to explore and experiment; encouragement employees to ask others for assistance when needed, encouragement employees to discuss their work with people in other teams. Then the formal side, there are mentorship, apprenticeships, arranging for employees to interact with new or less experienced employees, offering off-site training to keep skills current and arranging for employees to participate in project teams with external experts. So if you now look at the informal actions, it seemed to be more prevalent that the formal actions. Why would you say is that the case in your company that the informal activities of a knowledge culture are more prevalent than the formal activities?
I.38	MD	I don't think that is what I would like it to be. The fact that it turns out that way probably is just a matter of line management culture. I know that the business analysis line of business is much more formal than in the systems analyst line of business. You see, it's two totally different types of managers that sit there. The one guy is much more structured and acts more in line with what we want; The other guy again is much more practical, and he runs with stuff; and he has great success with how he does things; So I do not think I can really shoot it down; we cannot say it's wrong, but it is not necessarily what I would like to see. While the other guy does much more, his mentoring and his almost … his Learnership-type approach is much more structured. I think it's just a management style that exists in line management.
I.39	MC	Now we have finished with Intent; Next we come to the knowledge orientation. This looks at how knowledge and information (which is part of knowledge) is viewed by the organisation. Good, the first question looked at knowledge types. In the survey responses you have indicated that both explicit knowledge (that is information) and tacit knowledge (in people's heads) are significant and strategic contributors to your success. Okay, so it covered "capturing knowledge; providing experiences for employees to build relationships over-time, identifying best practices and sharing it within the organisation, and providing opportunities for employees to develop new skills. And you indicated that all four of those are significant contributors. Why are both explicit and tacit knowledge important to you at a strategic level?
I.40	MD	Because people are all we have. We don't have machines. So that is all we have, and the better equipped and more knowledgeable the guys are, the better the level of service we deliver. And that's why it is so important that one tries to enhance it further. Now it's actually, I won't say it's contradictory, but you know there are guys walking around here that are smarter than me, and if they were to leave tomorrow they will leave a hole this [gesture] big. So now the challenge is how do you prevent the hole from being that big, and then you rather try to gather the information so that when you have a successor you can at least say, look here, go read more there, then maybe the hole is not so big. But the bigger challenge is how to keep the guy. It is a big challenge. You can never fully capture the tacit knowledge. That is tacit. It is not formalised. There's a saying that goes that we are not managing a pond, it's a river.
I.41	MC	Good; now we look at the type of activities within the company. If we look at the 'outcome of activities. Thus the outcomes of what you do, you have indicated it is fairly predictable, compared to Totally uncertain and 100% certain. So if you have to consider the type of work you are doing as fairly predictable. What can you attribute it to?
I.42	MD	Well, if I cannot say fairly predictable, then we are missing the bus. If you tell the customer you're going to ask him half a million to do this piece of work, and you cannot be fairly predictable about what the outcome will be, then you are misleading yourself and your client. And methodology will help you to do it; experience helps you to say here, it is half a million rand, or it will cost 2 million rand cost. So the fact that it is fairly predictable is hugely important, and in order to achieve our the methodologies, we have frameworks with which we quote and we also measure to make sure the projects make profit, otherwise you will not show profit. So I will not say it's always 100%, that's why we did not choose the third option. Then there

		are projects, we now have one, where we actually told the client that we shouldn't continue with the work as it makes no sense. And then it's actually predictable that it is NOT predictable. You are not going to end up where you think you are going to end up, and then you should rather stop.
I.43	MC	And then you indicated that the activities your company deals with on a daily basis are variable as opposed to totally unique or exactly the same.
I.44	MD	It is variable. It's not as if we are production workers. And it is not R & D we are in the application of disciplines and of technology, so it's the middle one.
I.45	MC	You also indicated that methods followed in your organisation for dealing with different clients are very similar.
I.46	MD	Those are the disciplines. Yes. It is the methodology. We take those technical wheels and say listen hear, to do simulation work, there is a specific approach, to do business intelligence we have an approach, to do workflow we have an approach, to do a project there is an approach, so that's why. And it works.
I.47	MC	Then if we look at knowledge sources, sources of knowledge within the company. Work in your organisation is often completed in a collaborative manner and sometimes in a reciprocal back-and-forth manner. Why are you following these approaches?
I.48	MD	I think it's just a kind of interactive work, all the experience is not just in one guy's head, and it's a team, it's a bunch of guys who have a goal to achieve. That's where the synergies are coming from.
I.49	MC	As far as the role of knowledge is concerned, the survey indicated "Using proven, inherited or standard processes to deliver services is a significant contributor to your organisation's ability to compete. Thus the role of knowledge is to use the standard and proven processes. Why is that role of knowledge important to you, as opposed to innovation, improving processes or adjusting the services you are offering?
I.50	MD	You see, the standard processes provide a foundation. It does not exclude the other ones. I think it gives you a foundation to work from and it is not cast in concrete that says you need to work like that. It's not a production process; It is more of a guideline I would say, within which one would expect the guys to be innovative, and say listen, in this instance this procedure does not work, so we must follow another path, and the last section will be the same, so you understand it's an adjustment. It also is an improvement to go back and say we actually our generic process should look differently. To be honest, as part of our strategic objectives last year we stated that we must ensure that we return to every project and to check the methodology. And we haven't done it (laughing). Before you know it, the project is finished and the guys are working on the third project already. At least we aspire towards it.
I.51	MC	Okay, so now we come to the last part, of the enactment, we already looked at what your intention is with KM and how your view of knowledge manifests itself; and now we look at the processes within the company. If we consider the first one, Coordination, coordination of the processes, how you manage it, for example indicating the direction in which knowledge should be developed, providing feedback on knowledge initiatives, managers receiving feedback from subordinates, matching sources of knowledge to problems and challenges, making knowledge accessible to those that need it; mapping employee skills and expertise to the organisation's knowledge requirements, knowledge filtering and knowledge s management. The survey has shown that you do not have formal processes throughout when it comes to the coordination of the knowledge environment. What would you say are the reasons?
I.52	MD	I think it's just a growing process, I think one should try to get there. I think the first step is to try to capture the expertise. Then that is the next step, and I think that's the challenge because how do you focus on it, it's something you specifically need to put energy into to make it happen, it's not something that happens by itself. And if it happens by itself it is a kind of individual who made it happen. So I think it remains a challenge to get it done.
I.53	MC	If we now look at the use of knowledge, Knowledge Use, there are the typical processes "applying knowledge learned from mistakes, applying knowledge learned from past experiences, using knowledge in the development of new products and services, using knowledge to solve new problems, using knowledge to improve our efficiency, using knowledge to adjust our strategic direction, and converting knowledge about our competitors into plans of action." These are the processes around knowledge use to which I look, and again, some processes were rated as more formal than others. Why do you think are the processes largely unstructured?
I.54	MD	Once again, we're just not there yet. You know, we are at the point where at least we have started to capture the stuff. I have a question, maybe you can tell me, I think with the Internet, the available resources … you know I remember when we studied or when I have studied, I do not know when you studied, or studied undergraduate … no such information was available. I think you had to go browse through cards in the library to get information, whereas now you just type in on Google and you get everything you want. I wonder if these guys ever actually go look at our portal, or are they rather are going to look for it, go to Google to find it on any business process management group or the group of six sigma management or whatever, go get his information and use it. We are members of such interest groups, but it is not necessarily part of our information base or knowledge base: and you know these are only questions I have. If it were the old days, and we could show this resource, and have it available in the knowledge base, then the guys would use it more, but now there is so much information that other guys may not necessarily go on our knowledge base to look for it. It sometimes happens that a person will say listen here, I have read this interesting article and then distribute it within the group wif they have an interest in it.
I.55	MC	To conclude, the next question look at knowledge creation, how knowledge is created, "to generate new insight from existing knowledge, acquiring knowledge about our suppliers, using feedback from projects to improve subsequent projects, exchanging knowledge with our business partners, acquiring knowledge about new products and services in our industry, acquiring knowledge about our competitors, benchmarking our performance, identifying best practices, exchanging knowledge between individuals. It is again no formal processes, but unstructured activities?
I.56	MD	Again, I think we create the information, we try to catch it. Let me give an example. We have a project report that we are trying to create, we call it a closure report or an evaluation report, which we created. The process now has been a little shipwrecked the last few months because the guy that was responsible for quality, we had a guy for that, pushed it hard, and each month we had sessions with all projects and there was a project report; and a close out report which looked at everything that went wrong, what went well, what else can we do so. But then we put it in a report there on that project. It's not something we necessarily, but guys remember it, but it's not a structured way to now say we must remember that green paint every time

		we're done. The search within the portal does not work properly. Because this is a bug in the portal software, I hope the new one will be right. I was discouraged struggled with the software, because we cannot get the rights sorted that guys can see what to see, then see them again things they should not see: and then everybody can see everything again. It was a confused bunch, so I hope we go a step jump at the new application.
I.57	MC	The last question is about integration. Here we also look at how to integrate the knowledge of individuals or the organisation's knowledge and disseminate it to the rest of the organisation. And all processes again were rated as unstructured, except for "Distributing knowledge throughout the organisation" which has clearly emerged as a formal process, but others such as "transferring organisational knowledge to individuals, absorbing knowledge from individuals into the organisation, from business partners into the organisation; integrate different sources and types of knowledge, replacing out-dated knowledge, capturing and sharing frequently used concepts, information and methodologies, sharing stories about organisational failures, Successes and how work are done in the organisation, and then capturing and sharing terminology commonly used within the organisation.
I.58	MD	Yes, that's a mouthful. It is the use of information and I think that's where we actually fall short a little. I think we are starting to do the right things to try to capture it and so on. But if people don't go and fetch it … so it remains an uphill battle. It's like communication. You can write newsletters to the guy, but if he doesn't read it,. And I think one can achieve it by creating a culture. But some people simply isn't like that, don't want to be like that. And then you get the guys who are like that and if you continue to encourage them, so I think one can achieve it, but it doesn't happen by itself.

Translated Focus Group Session (sessionwas multi-lingual)

Ref	Speaker	Content
G.1	MC	You all have indicated that Fourier has a formal knowledge management strategy. Why did you say that and what are the reasons that you consider KM as important?
G.2	André	I would say that now days the turnover of people is very high and people don't stay long at one company. So for that reason, to retain the knowledge within the firm and not with the person. We simply try to retain it in Fourier rather than individuals because if we lose them then we have a problem or a large gap is left.
G.3	Heinz	There's also an action that called IP creation; things we learn in practice that we would set up a certain form and then you're going to make this available to the peers and so on, so there is a definite thing to do with it, so as he now said that it will come through that channel at a point where it is collected, it is sifted and analysed and then you say well we have a deficit in this area, we are performing very well here, and that, as I understand it, is t there so that for example process models can be built which in practice has been shown to work. So that now you can continue to apply it, and then also the second part is to reach a point where you can even start utilising it as a marketable entity. That's how I understand it, and it is in place. That idea is definitely established.
G.4	Graeme	That's where I was going ... what does Fourier sell? There's the thing-a-ma-bob that you put down, and that's our asset that we need to build on, and gain experience on the other. So your point (looking at Andre) about the newbies coming in or the joiners and leavers, they've got something to learn now, but we also got to ... we get better, we learn more, we grow more. And we can then get a resource that feeds us going further.
G.5	Pieter	I also agree with that, but there is a strategy, because we were at a Bosberaad, that was about a year ago and it was one of the items on the agenda, the IP that our board has pushed very hard. That is important and will be part of it is performance appraisals, and that the portal will be used for it. So there's definitely ... that's why I said there is a strategy.
G.6	MC	And how do you know that the strategy is?
G.7	Heinz	I think it was a while back, that I participated in, every month there was… you had to write a paper to say this month I have learned or I've used this and it worked. So it's a ... I think individual effort where each person in his field work where each person had such a setting to say here's my contribution. I have observed the following that gets done or that doesn't get done. To what extent it came to fruition ... I don't really know, but I think it was part of the portal idea, the physical place, a portal was created where you can store these things.
G.8	MC	The survey indicated there are different opinions about what the focus of the KM strategy is. The views were: knowledge is central to our business strategy, transfer of knowledge and best practices, management, or customer-focused knowledge, and innovation and creation of new knowledge ", why do you think are there so many different opinions on what the focus of the KM strategy is?
G.9	Pieter	I think it's the beginning of our problems with KM, it is at that high level we know which direction is not ready, which means that we are going to do KM. Does this mean we have only our documents we think nice practices on the portal set and forget, or, I think that's my biggest problem you have said, why our KM to management: who's the owner of the thing, we does not know who the good really drive, is there anyone who really press for that that our capacity our knowledge built up within our portal, I do not even know who's, I know technically how to search people for good, but I know not where to properly classify, Now, the guys who operate the portal will say no but we gave you a category created, and I know there are good, but it's as if nothing happened within that framework of KM not so for me it's kind of an issue of the well, but I do not know what will happen to the good, or it will be used.
G.10	Graeme	That's my opinion as well, it's a great concept, Conceptually, we all know why, people are putting in data for different reasons out of their concepts of KM, but then the utilisation sits a little bit short.
Jaco enters room.		

G.11	Heinz	I would agree with Pieter. I think the different responses illustrate the gap that even with customers. Conceptually if you would do it top to bottom, it does not happen, and there's a technical thing, but it doesn't meet this conceptual thing somewhere in the middle, Now there is a hole. I think that is why there are different answers.
G.12	MC	The third point was, the survey results have indicated that you the following benefits of KM expect, "Increased productivity, better response times, and reduced cost." Why are these three important benefits from the KM program?
G.13	Graeme	The one thing that comes to mind straight away is the fact that if you're going to a new environment, it's new to you personally, it's not new to the company. You can at least research it and go in with a lot more confidence, a lot more background knowledge, on the specifics and also the client. Where if you do not you go in there very cold and you spend two weeks finding your feet, and pretending to know what you're doing, where as if you go in with knowledge and facts and experience you can hit the ground running.
G.14	MC	Anybody want to add something?
G.15	Jaco	I think we're investing, Because we're selling people actually, I mean we do not have specific products or stuff that you take from the rack-and stuff, so it means we have to invest in our human capital, and therefore you must sort of get something back if you invest in that, and I think that's part of the stuff that we want to get out, because we do spend time where, not enough, but we do spend time where we share experiences and specific areas and stuff so that's just why we do it is obviously something we want out of it.
G.16	Pieter	I want to join in, but it's an issue because of the service we provide, the quicker we can offer something to the client, the better for us because then you get an opportunity for new work and better rates and only a good image with the customer, and you can reuse something you've already done, and if it is done well, there is no reason why you cannot do it.
G.17	MC	If we now look at the structure, the survey indicated there are different opinions about whether you have a formal KM function. Some people say yes we have a formal KM function, others said no we do not have a formal KM function. Once again, why did you say we have one, or we have not one. What are the reasons?
G.18	Heinz	It is again the execution. I mean conceptually there it is, and there's something on the technical side where you can put the things that you learn and experience. But the two are not connected. There's no analysis, or an active process to say good, now I take all this knowledge and I begin sorting through it; I now start to categorise and then I began to poach and say well that's what guys in these circumstances have found work, that does not happen. Thus the two things are just left hanging in the air.
G.19	André	I agree, the structures are there, but the application or the processing thereof and the discipline is not there.
G.20	Pieter	And there's also no ownership of that specific function.
G.21	Heinz	There are no allocations specifically for it: it is not part of the process to do something with.
G.22	Pieter	There is definitely structure, there's a strategy we should execute and we are going to publish it, but I cannot see myself, if I want to develop something, using the portal to go and type in something and hope I get information about it, I probably will not get anything, and the things that I will get back are the stuff of the guys that I already know who are working with me. That's probably part of not being a large company, so I already know what they know, and I can just ask the guy next to me directly. I do not need to browse through a system.
G.23	Heinz	But I do not think there is any accumulated knowledge. If someone sits down to analyse the accumulated knowledge, then I'm sure from it all he will be able to put something new together. Perhaps a specific method or something that is workable. But there is nothing like that. We schedule among ourselves, but I do not think at this stage anybody is looking at these things.
G.24	Graeme	I also think the sharing is very much client-specific team. If I think about it the two of us [Heinz & Graeme) are sitting at Nedbank at the moment in a team of four, and we will share experiences and we are sitting, the four of us in this area [gesturing small area], I know exactly what problems he's hit or he's hit, and how they resolve it, so in that way it's shared, but it's never published back, up one level, and there it sort of dies off. And Occasionally someone has a brilliant idea and has the updates and things, but is not on a, it's not like call it a diary or a scheduled thing that you're forced to contribute to.
G.25	Pieter	The one thing that it is not, I do not think it's anyone who wants to withhold information in order to protect his job. I think with us, I know that if you ask anyone something, the guys always give as much as they can. People want to share. I sometimes do not want quite so much information. [Laughter].
G.26	MC	There are different opinions about whether you have designated roles within business units to encourage knowledge sharing and use. Yes, we have such roles, no, we do not have such roles …
G.27	Jaco	I think on paper, as a line manager now, this is well defined. I think you have the technical wheel heads that are supposed to chase these things and should get things in place. I think every person's KPI's has a part that says the IP, and KM, as every guy's contract is signed, but we are just not taking out. We have the structure and we have the portal, but I think the portal work for anybody, you understand, but it could just as well a file server to be located there where the only good save, so the structure is in theory there but he does not really support our business. So that's the one thing and another thing, I think that is a problem with it is, I think we attach no time out, because if a guy has that or he could be recovered on a project, Then he said recoverable work, as he is now a week out and its recoverable knowledge back into the team thing, and I think it's a chicken egg thing, because we do not do it because we do not really see the value not because we do not. [Laughter]. We do not do it justice.
G.28	Graeme	The point was raised, when we started the Ccom projects and we had few projects, is that we finished the contract where it gets signed off, is the client happy? Yes. Did they pay us? Yes, put it down, go to the next one. And there's that little portion of administration and closure, which ones were not? Okay what did that project teach us? Before the guy can get taken off to the next project. And that has not been enforced.
G.29	Jaco	Yes, again it's there. I mean there's a part in the Close-out report, the PEER, I'm not sure what it stands for, but it is there. And it's supposed to be discussed every month with all projects that have been closed, but we just do not get round to it.
G.30	Graeme	Because we're working.

G.31	Jaco	Yes, Because we're working. So in theory it's there, but it's not being applied.
G.32	Graeme	I think in general what we're saying is that practical enforcement is not happening.
G.33	André	I think it is because we do not see it as working. We do not value it as working so that is why you rather work. We need to get it to a level where that is also seen as 'working'.
G.34	Graeme	But it ties in with what Heinz was saying as well. It's like when I you're just looking for something specific, you go the web and do a concentrated search there and you get ...
G.35	Jaco	Sometimes you do not even know what you have to ask. We do share information and stuff, but I'm only sharing information if I'm prompted for it. There are other cases but I mean specific information only if you ask me for it. And if you do not even know to ask it, then I'm not going to share it. You understand, and that's where we lose opportunities and some cross-pollination.
G.36	Graeme	But you do not think there should almost be something that we take it even further that I do not just say to Peter go here and update the portal, but say there's your workbook, here's your structure that you are going to complete about this project, and if you give some prompts, like you've got your promt questions with potential answers, Because here's my version of what the portal, in fact all of our programs difference already, so what I think is value-add someone else Thinks here's someone who Wasted a lot of time typing this up, and you should be guided man.
G.37	Jaco	But that's the question about our structure. Does it really support what we want out of it?
G.38	MC	The conversation touches on the idea of technology the whole time. I hear you have a portal. The survey results indicated that there are different opinions about whether the technological tools used in the company supports KM. Given the discussion we just had, do you want to add something?
G.39	Pieter	I would say whether we do KM or not is actually an irrelevant question because we do it, and we're actually doing it quite well, where we do it at our customer. But we are not doing it technologically. It's really a question of I know that guy can do it, I will ask him and he gives me a quick indication of what I should do and I do it. So the problem with it is that if you take the person away, you take the knowledge away. So, you have asked whether our technology supports KM. I think it can, but it's almost as if we do not need it, but we still use the underlying way of knowledge sharing. But I think what we have in terms of technology is some of the better KM technology available, we can use it.
G.40	Heinz	If we look at those things that we see demonstrated as Casewise, QPR, it's technology, but it is intricate. And mostly we get so frustrated because it is so intricate that you simply don't use it. You have a dedicated person running with it, otherwise it is useless. You cannot do all your work and still learn how to use the tool correctly with all its different functionality. It is a great tool, great tools, but it's like there at Nedbank, you know, we are now working to rekindle that thing, but goodness, it's serious.
G.41	Jaco	It becomes almost the 'end' it is not a means to an end ', it becomes the 'end' to maintain the tool.
G.42	Graeme	But what she is saying though is that it's not self-supporting, and that it should be, we create our inputs and it just does it, as everyone Adult animals systems work. But if you're saying you have to have a dedicated resource and if we do not have that resource, then it just fades away and then we get into garbage. And much like the Casewise tool and also our portal tool here as well, that if you do not have that person committed kepping it tidy, it's too much work for the other guys, above the time-consuming typing up etc.. to maintain that and then it just drops.
G.43	Pieter	I want to use an example – the QPR installation. It must be the 100th time I had to redo it, and every time I do not have the documentation.
G.44	Jaco	But it's your fault. [Laughter].
G.45	Pieter	Anyway, this particular software, we try to install, there is a server crash if there's a new version, then we try again, then we cannot get it right, then we call the vendor, who will help us each time, and each time he promises to send us the latest information, and every time I think this is the last time, I will now put it in the portal, but then again he is just a phone call way, and then he can just come and do it himself. So I know the right thing to do is to put it on the portal; to sit down and make it available. Next time someone asks it's there, go look at the portal. It's the right thing to do, but in my head I know it will change, I do not now feel like a building it, and in any case the guy knows best, he will come and help us. That's why I have not put it in yet.
G.46	MC	The other question looks at budget. You have all indicated that the company did not have a dedicated budget for KM activities; and also that you didn't expect that the Company will have a dedicated KM budget within the next 24 months.Why do you say that?
G.47	Pieter	We do not even have a budget for entertainment! [Laughter].
G.48	Jaco	[Laughing] It cannot be the same.
G.49	Pieter	I cannot imagine that Pieter Conradie will say let's put some money into the thing. Maybe new investment in the technology side, but not someone, a half-day appointment to do it ... or a Custodian or a DBA.
G.50	Jaco	I think it fits in with the thing that is ... that it really should be seen as part of our normal work. We are already paying Andre a salary and Graeme, so KM should be part of that. And that's why we do not specifically put money aside for it.
G.51	Pieter	But that's probably because we know, in my head I know there's not a budget for this thing, there's no one really looking at it, someone whose role it is to look. So it's not really so important, so therefore I do not do it. There are other important things to do.
G.52	André	I just think, Jaco I do not know, you'll be better able to answer, but there is in my head are possible money aside for it as part of a larger lot of things for which money is set aside, all of which fall under your line, where you have time to devote to your line of busienss against such things, to general research, against such property. I know a small component of it is there, but we do not know how big it is and whether it really has been, or is that really the only other well, so I think someone somewhere has already thought about and so little time, little time set aside for it, I think it falls under a larger umbrella of a bunch of other things too.

G.53	Jaco	What happens is, there is time for the technical wheel that really should fulfil the role, or the leading role to play in the knowledge effectively. But not necessarily for it to capture not. Thus it is not necessarily to be in the portal to find and good. So there is such R & D side, but there is not to say a part of it is now explicitly order to get. And another thing what happened but Andre is a man to sit still long here and is not recoverable, then go when he Nedbank. [Laughter]. But that's just the press of time that we do not really access it, I think we need to say we are going to appoint someone that for 6 months only the structures that will settle this thing a little well do we want it to do. So it is right. So that our business support. But it's that we just not come off.
G.54	Graeme	But still there is no enforcement of the structures, Because there were structures there from Bischoff, Kobus Bischoff put it in and then he managed it, there was something there, but there is no enforced the follow-up us we make it grow and expand and become so critical that we all know we should feed it in, it was just there to, and now it's being Wasted again.
G.55	Heinz	But as Andre said that the way that it is made available to everyone is incorrect, Because it takes a very knowledgeable person who's worked with that thing for many many months of to do that. And I'm sure these things can be presented in a very common ... user-friendly way, that you do not need that knowledge. You know that I just need to add this document and there it goes.But at this point, the one running at Nedbank; Those poor users, they cannot use it; it's just too technical. I'm sure we can make it user-friendly. That's perhaps the same thing that we have to ...
G.56	Jaco	That's just going to take some investment, or somebody to sit there to get the requirements.
G.57	Heinz	Get the requirements: How do you want to see that information. And how do you want to do the input and so forth.
G.58	MC	Something related to the budget. The survey indicated your company employs mechanisms to encourage the usage and sharing of knowledge. And you all have said knowledge usage was considered in appraisal interviews and salary negotiations. Can you give an example of how this occurs? Indicating that the mechanism is in place? [General laughter].
G.59	Heinz	[Laughing] We have never seen the execution before. [Shows money sign with hands].
G.60	André	I think it is in the KPIs for each person. The measurement of it, I think at this stage is a subjective measurement, where he will tell you these three things you've done, so you've qualified more or less for that part. Where we might more need a checklist-type thing, where you say you have done these five things properly. I feel the application is more down to opinion and not on ...
G.61	Jaco	Yes, a guy can look at the stuff. But the thing is again it's this guy has 20 thrown around documents, fine it does not ...
G.62	Pieter	What I think will happen with a review, I do not know whether, if they are good at that, and you should now have one point from five out then go get your manager with you sit and say no, you didn't really have time for it, so let's make it a 5, then we go to the next one then. So it seems it is not yet part of the important issues.
G.63	MC	The last one in the Intent dimension is the learning culture activities in the company. There are certain activities that are informal, others are formal. The informal activities are focused around encouragement, such as encouraging employees to explore and experiment, encouragement to ask others for assistance when needed, encouragement to discuss your work with people in other teams', the activities are more formal action formally managed; " use formal mentoring practices, including apprenticeships, arranges for employees to interact with new or less experienced employees, offering off-site training to keep their skills current, arranges for employees to participate in project teams with external experts. Within the company, the informal activities are more prevalent than the formal activities. The formal activities were rated as seldom or occasional; while the informal activities were rated as often. So why would you say this is the case?
G.64	Graeme	I think it's a lot easier for me to gain knowledge from an area expert, say for example Heinz and I work next to each other, I then go and pick his brain for half an hour or get him to train me up, than to say budget I need to go on this course and I think it's the right course, but maybe I get it wrong and then I'm out of the offices for two week etc.. The reason I'm asking him the question or for additional knowledge is I have a problem to solve now. Not a potential problem in three weeks time, that I can timewise budget for that. So I think it's a lot, I will not say it's the lazy way out, but it's actually far simpler if you know you've got an expert area nearby, you go across and just ask him for that knowledge.
G.65	Jaco	And it's more focused.
G.66	Graeme	Yes, if you ask him about a specific question, while a course is more generic and not as relevant to that specific scenario.
G.67	André	But I think that what the formal bit refers to there, Heinz, is that before you even got that problem you would on a weekly basis meet with few other guys from clients who do not have direct contacts, and add a few things, sharing knowledge that you've already picked up. I think again the reason why it does not happen, the time and importance aspects.
G.68	Graeme	It not only the time thing, but I mean when I was last at one of the Fourier functions down here. He [Heinz] and I are in the south of Johannesburg. He's [Jaco] now in central Johannesburg for most of his time. I do not talk about you [Peter], because you're just around the corner, and I do not know where you're [Andre] based at the moment, but everyone's together for a sort of semi-formal afternoon. He [Jaco] mention what the traffic is like, he [Heinz] left the client at two-o'-clock, it's expensive in the long run, it's the nature of where we work at the moment, that's a portion of it.
G.69	Jaco	Yes, you want to make it fun when you see the guys, you know, if you would rather sit here and a beer or something with the guys drinking and say tell me a bit about what's happening in Fourier, it's again more informal than a formal type of thing but actually knows, maybe you can formalize it by once a quarter to do.
G.70	André	E-conferencing [laughter].
G.71	Pieter	I think at our customers our focus is to get the job done there, we never even think further about what will happen in 10 years time if someone else take over the job and you're not here anymore. I mean we just try to get he job finished, for example, when Rudolf and Sebastian left, it's guys who have recently resigned. A month before the time I got on their case to begin documenting what they've done, and I checked it every day, every day telling them this is important for the following month, until they completed it and put it in a folder at the client site where I will be able to find it. I could have placed it in the portal, but no one would use it. You know it would only be stored there and nothing would be done with it, or I

		could sit with the new guy at the portal, and tell him to logon and then go and find it, but it's almost as if that's not needed, the important thing is that he can access the document on at work.
G.72	MC	Don't you have access to the portal from the client's site?
G.73	Pieter	No, it's quite a ... good question [laughter].
G.74	Graeme	I would not raise it here, but we seriously do not have access.
G.75	Pieter	If you were to ask that question to a director he will say: "I will fix the portal". [Laughter]
G.76	Graeme	We struggle a lot to get in.
G.77	MC	Next we turn to the Knowledge Orientation. This is about how you view knowledge within Fourier. Good the first one was in terms of tacit and explicit knowledge. Explicit knowledge is information, that you capture in the portal. Tacit knowledge is what a person has in his head. Well, within your group's responses was providing experiences for employees to build relationships over time, and providing opportunities for employees to develop new skills, both of which refer to tacit knowledge, you have indicated are more contributirs significantly to our ability to compete; to explicit knowledge, "capturing knowledge of experts and making it available to those that need it, and identifying best practices and sharing it in the company.Why do you think is the tacit knowledge a bigger contributor to the company's ability to be competitive?
G.78	Graeme	May I ask a question to the panel here [other participants]. When we say it has tacit knowledge skills? That's how I see it, it's something that somebody's built up with experiences, it's not in a book, it's a combination of four books and five clients, so it's skill and history, and I think that's what we're really selling - the competency or somebody, it's for the very junior guys to come in and, yes, they come and they're all book-learned and they know that great, and then they start to learn what the client actually needs and how the client's bastardising the concept , and then his skill [Heinz] comes in and his skill [Pieter] comes in and says yes, the textbook's nice but actually those in points, just believe one and seven, and these are the others that u need to work on, and I think that's what we sell.
G.79	Pieter	I agree. We've got more to sell. We're not an aircraft manufacturing company that has this checklit or tasks that we need to do this part to manufacture. And then repeat it as well. Everything we do, jis, I'm speaking English, everything we do about a customer, you have to try to establish a project to put together for that specific purpose. Not quite, but more or less.
G.80	Graeme	Ja-nee, you base it on experience.
G.81	André	Yes, it depends on what kind of project you are involved in, there is of them that we reuse large portions, at least, the methodology of how you approach it, and reusable parts of it and that's where we really want to get to, the more we can make it reusable, the less time, less money, the greater the profit. So that's where we want to go, but it was not the original question.To return to the question ... [Laughter].
G.82	MC	Jaco I see you are frowning a little?
G.83	Jaco	Yes, I think we use the tacit more precisely because the explicit is not there. Do you understand, I think we use there what we have. I am thinking of the methodologies, as well the simulation, we now have a methodology that can be reused, and we use it there, and we reuse them. And I think with some of the other things there also are things that are reusable, and therefore we use it, but of your work [Peter] and yours [Graeme] that explicit knowledge has not really been created: and that is why we cannot use it. And that's precisely why someone is struggling to start, because he must first get to know the business and must spend three months with guys like you to turn milk that information. But that's just a symptom of the fact that we have not explicitly defined it.
G.84	Heinz	For me it is much the same problem as at Nedbank itself. They struggle to get the specialist knowledge that she has from her. Because time is a big factor, there are so many things in the day-to-day job; because the point is that a person will have to sit with another person and you will have to extract that information or that knowledge until it's finished. But now there isn't time to release the resource with all the knowledge to do it. And in a sense, this applies to us too.
G.85	Graeme	That tacit information that sits in that person's head, you can never sit down and ask her the right questions and questions Sufficient to get it all out, OK. You'll get what's burning now, but the tricks of the trade over the last ten years, it's not gonna come out.
G.86	Jaco	Yes, but what you should do is that portion that's burning, you should document it. And the next time you should sort of fill in the gaps type of thing. So that at least in two years or three years time you have sort of these pieces of explicit information that u can start reusing.
G.87	Heinz	You're right, but what you've just said is a very important thing – time is needed for it.
G.88	Jaco	No, I realise that ...
G.89	Heinz	But what happens there and I think it happens in our company, and any other ones, before whatever percentage of time you need may need has been set aside, gone is the person. And then you make a new one appointment. And you start all over again..
G.90	Graeme	You see the thing is that the fact that we can sit down let's say in a year's time with Griselda and we can drain her dry and put it all down in information technology, at the end of that year it's a year old. They've upgraded they've changed, they've done this and the other, so you're Chasing those amendments the whole time, and that's the person who should have been the ammendments doing at the same time. That said, but also your tacit knowledge is what makes the business profitable. Becuase if you were to take the textbook knowledge that's around, he and I would not COMETE well, Because we'er doing exactly the same thing. But it's that little skill, tacit knowledge, that little bit extra that I do, that will get one up on him, and then he'll learn from what I've done and he'll bend it, and approach it differently and so we'll compete the whole time, so I think that's how we actually make the value for the client.

G.91	MC	Good, we look at the typical activities within the company, and a statement that came out is that activities within our orgnaisation are fairly predictable. As opposed to totally uncertain or 100% certain. From your experience, why is it fairly predictable?
G.92	Pieter	We always know we will have a bugger up. [Laughter].
G.93	Jaco	I think that's the nature of our business. We are consultants, so we go into environments in which we are not quite as an expert familiar with, but then we learn to know him, so we learn how to apply them.
G.94	Graeme	That's what sells us. Is the fact that the clients hit the wall for a large part, they can not think that little bit further. And that's what where we can add value straight away.
G.95	Jaco	Yes, and you will now go in and investigate, and you've got a good idea of what you want to do, but you can not hundred percent say it was how the solution looks for the time, because part of our job is to look for a solution, to identify one, to evaluate it and then implement it. So I think that's why but it is fairly predictable. If it is a repetitive thing then you don't need skilled guys like us anymore.
G.96	MC	And why do you think is it not totally uncertain. What do you have in place to give you some idea of what the outcome will be?
G.97	Pieter	I think we know we have the skills to do some things right; like if we have a project at a client's workplace to launch and see who's on the team, then you know immediately what their strengths are and you know it will work. And if it does not work, then someone will come and help.So we are pretty driven to make things work properly.
G.98	Jaco	I think there are some concepts that we know work, you know, for example, how to defined KPIs and other things, so you've got half … this concept, almost methodology that you know you're going to apply, but you're not sure what answer will come out. But if you go through the methodology, it leads you in this direction. So it also helps that a guy knows these are the steps you follow. Simulation [point to Andre] is the same ...
G.99	André	I think you've got a fault-finding method in your head, and a problem solving method in your head of the last 5 or 6 projects you worked on, and you've got it half developed into something. And the more you interact with different guys, the more you add on, how they match, and what is different, and the guys build their own method really.
G.100	MC	The work you do on a day-to-day basis, was rated as 'variable', as opposed to exactly the same "and" totally unique. Why do you say this is variable and not 'totally unique' or 'exactly the same "?
G.101	Pieter	I think generally what has happened at our client site, if something is repetitive, then they appoint someone to do it. If something is variable and it will not be overhauled, as new systems must be built, or, they will rather get one of us, whom they pay more for a short period of time. About 20% of my daily work is repetitive.
G.102	Jaco	Our job is basically to create the structure so that it can be repetitive. It's actually part of what we should do.
G.103	MC	And a question that goes with it. Methods followed in your orgnaisation for dealing with different clients are very similar. Why are you very same methods?
G.104	Heinz	I think it has more to do with the horizontal application. In other words, Business analysts use certain methods and approaches that they have learned and it is based on best practices on an international level, or whatever, and it is things that we all will be applying to some extent. It will naturally be different in the case of a systems analyst, and the coders, and so, they will again in their domain be applying a very similar thing, so I think that is the reason why.
G.105	Pieter	Yes, and it's also as the company's culture grown, we now know all of our systems are built on SQL Server so we know now, we all know now how it works. And we know if we have a system spec Agan or any proposal will then get those technologies and that is how it works. So it half resides in the company historically.
G.106	MC	Good, then knowledge sources. Within the company you are mostly working in a collaborative manner, and sometimes it is in a reciprocal back-and-forth manner. Why is it the way you work?
G.107	Jaco	I can hardly think that there is another way than just that, because it's through working with the guys that the synergies and diversity emerge.
G.108	Graeme	I think it's also the fact that you've learned each other's strong points. There's stuff you know you would not give to me Because you will not get an answer, Which you'd give to Peter, get the answer then pass it over to me, Because I look at the same thing in a different manner, and we know what each guy is strong with.
G.109	Pieter	Now the market dictates what we should do, because the type of problems we solve are at different levels, there are higher level things and then there are the technical level things, so you can not do everything.
G.110	Heinz	At our client there is a very good interaction between the levels, we achieved such great success with that method precisely. So, we know that it works. And I think it works especially well because in that line everone now is from the same company, so you know there is a common goal and so on. If you look outside you can see why it does not work well, because you know the division here and the division there within in the same company, have a go at one another daily. They really let it seem that they do not need to see everyone working towards a common goal. But if it only works, it works really well.
G.111	MC	Good. The survey results indicated that using proven and inherited or standard procesess to deliver significant services is a contributor to your organisation's ablility to compete, as opposed to for example, to constantly improve your processes, or to constantly innovate in order to have access to unique expertise or unique knowledge that you sell. Why would you say is the role of your proven processes so important to the company?
G.112	Heinz	Well, I think it gives substance and gives it clarity and gives it a foundation. Because I think most companies, only innovate if they see they can make money out of a thing, rather than to create something new, but as long as that something works, they will continue with it. As long as there is money coming in on a thing or ... I think it is also true. I think there is theoretically and conceptually more a thing of innovation, and we come back to our very first questions about the system and things, discreet, and all those things, but here in the middle it will not work out. I see it as the same thing. I see here's a little thing that works ... How did one guy say, stick to your grazing and finish it off ("Bly by jou bossie en vreet hom kaal") ([Laughter]. I think that's what happened here.

G.113	Jaco	That is not a famous saying. [Laughter].
G.114	Pieter	But he said one guy said it [laughter].
G.115	Heinz	You see, I have just proven innovation hierso not work. [Laughter].
G.116	Jaco	I would not say that we don't see ourselves as innovative.
G.117	Graeme	Your core stays the same: Your Constants stay the same. It's almost like what sells SAP, apart from their marketing, the core is the same. It's the little bit at the top and the bottom that they customize for that client. The client Thinks his uniqueness, but in actual fact a billing system is a billing system; 99% it's the same, and it's just the little value that's presented and The little value that you give to the client on top, that they think they " re unique. You do not want to reinvent the wheel everytime.
G.118	Jaco	See the "proven" is important there, we know it has worked. And we know it can work the way we do it and it will lead us to a certain point.
G.119	André	I think the reason is that our clients and each project is different, so there's a 'proven' part, which is a process / methodology, and I can understand that there are firms, and they build cars, so they have a process and they must constantly innovate and improve. We have basic processes that we like, and due to overuse the environment where you use you must innovate. But we will not necessarily change the 'core' methodology as often, because we only have those basic needs, and then you are on your own.
G.120	MC	Good, a final few questions. When we look at processes, the first set of processes is the knowledge coordinating activities. There were a few options. But most of you have indicated it is unstructured. Why it unstructured?
G.121	Pieter	If you look at the portal – is is no there. [Laughter].
G.122	Heinz	No, I think again to return to the first question. Conceptually at the top it is there, and then there's the portal, but there is no formal process that the knowledge will be used by someone , be it on paper or whatever, take the knowledge and do something with it. That, you know, I something emerges from it. That does not exist.
G.123	MC	How do you know what must be the portal?
G.124	Pieter	See that's what I mean that time should be made. It is for me the most important thing we do wrong, we should really know what is non-negotiable that must be captured in the portal. And we do not know. The thing like that QPR installation. It must be on the portal, because it is a reusable thing and it should happen. And it is a classic thing for knowledge management. We do not know ... it's never been communicated to us and said these are non-negotiables, this is optional and that will boost your bonus with five percent.
G.125	André	Once you get your bonus, you know what was important. [Laughter].
G.126	Pieter	So we do not know really what is important and should be. And the other thing, which we also discussed a few times now, is when you want to put something on the portal, there is no one who then goes there and moderate it, to say here are the correct lookups, which will give you a hit if someone is looking for it.
G.127	MC	Good, in terms of knowledge use, again you indicated that all the activities are unstructured. Again, why?
G.128	Graeme	I think it comes back to that it's not moderated or structured. It's like the problem we're having at Nedbank. They want to index documents. They've that leg bouncing around for months, and everytime you go to another department thay pull the carpet from under you and start again.And it's much the same here. We'll take the same documents and the indexing Identify differently and put it in a different Sub-category, becuase he's got a different business interest to what I have, and therefore when he comes to look for it, he'll never find it , because he's got a third opinion.
G.129	Pieter	Or I'll find ten links the same thing and I will not know which one to use which one is the latest?
G.130	Jaco	But I think it's precisely the problem, if Graeme's defines the thing, and say this is how it works, the guys will use it. We will, because it has been defined, know in which categories to look. But the fact that Graeme does not know, and Andre does not know and I do not know, that's why it doesn't work, so we really only need one guy who says it is there. That's how I see it will work. And that's my baby, and you all can now put in your stuff. And we can start using that thing and then we can take that thing once it is established and then we can begin to refine it, but we do need that one blok who sit there, that's how it should work.
G.131	Graeme	Say we're going to get budgets and we draw some significant dinkende guy there, alright, now we do not feed him documents, both will happen, or sort At the same time.
G.132	Jaco	He'll pull it sort of for the initial stages, until we start seeing the real value, until you see it's making a difference in your life.
G.133	Graeme	What I'm saying is, you need to, why would it make a difference in my life, if I take the scenario where I'm sitting, I sat in Nedbank and I work with Heinz Heinz and I ask questions, and I neveranythiing feed back to the portal. I'm not forced to, so I'm not going to and then okay this is gonna put getting more and more bored and Retire or Resign after a week because he's got nothing. There needs to be that in between portion where he must say there's a guy out there, he must provide me with two or three inputs in a month, what's he doing, okay there, he must have that follow-up role, either positively or negatively imposed. So it's sort of Double-Edged.You need both to happen at once, it's not just that one wait for the other to occur.
G.134	Jaco	But I think the answer to that is, we say it's unstructured. But then let's structure it. It's really as simple as that.
G.135	MC	The following question is about knowledge creation. When new knowledge within the company is created, there again is no formal process. What I hear you say that it all happens in an ad hoc manner. The final question was about the integration of knowledge. You have once again stated that the activities are unstructured. What you have specified as a formal process is distributing knowledge thoughout the organisation. Why are the processes unstructured?
G.136	Pieter	I think if we do Knowledge Management correct, and all the stuff I'm sure you'll later tell us to do, then you have good answers that we can say we do so. But because we, already at a highlevel, fail with what we do, our processes will remain rather unstructured.

G.137	André	I just think that in the short term, currently, we find that the unstructured way works very well for us. And that is why we stick to it. It works at the moment, I think maybe it's selfish not to think about the the longer-term effect of doing it like that.
G.138	Jaco	It's not something we really do that often. I mean, having an hour or so just to sit and chat ....
G.139	André	But there's no time or budget for it.
G.140	Jaco	Let us not begin all over again.

APPENDIX H
CEDAR & KIRK LIST OF CODES

ID	Code	Data
1	Ad-hoc cross-departmental referrals	G100
2	Anticipate growth of KM function	G38
2	Anticipate growth of KM function	G39
2	Anticipate growth of KM function	G40
3	Article writing part of KPAs	G42
3	Article writing part of KPAs	G44
4	Can render a competitive advantage	G15
4	Can render a competitive advantage	G16
4	Can render a competitive advantage	I22
5	Clients demand valu-add on top of legal service	I60
6	Communicated through orientation programme	G5
6	Communicated through orientation programme	G6
7	CPT and JHB use same knowledge base	I30
8	Database of precedents	G5
8	Database of precedents	I42
9	Database processes structured	G81
10	Database-driven	G23
11	Dedicated KM manager	G19
12	Dedicated partner for KM	G2
13	Document templates	G3
14	Employees encouraged formally	I40
15	Executive committee decision	G2
16	Focus on improving services	I58
17	Formal KM feedback to management	G88
18	Formal KM structures in place	I26
19	Formal processes for case studies	G97
20	Formal processes for knowledge base use	I64
21	Formal processes for researching potential clients and competitors	G95
21	Formal processes for researching potential clients and competitors	I66
22	Formal processes in place	I68
23	Formal teleconferences	G52
24	Freely ask for advice	G58
24	Freely ask for advice	G59
24	Freely ask for advice	G60
25	House style considered in performance appraisals	G50
26	Implementing performance plans incrementally	I38
27	Improving way of doing things	G77
28	Informal coordination	I62
29	Intranet support KM	I28
30	KM function indicated on organogram	I24
31	KM function recognised throughout firm	G36
32	KM to facilitate transformation	I18
33	Knowledge base	G23
33	Knowledge base	I28
34	Knowledge base used constantly	G25
34	Knowledge base used constantly	G26
35	Knowledge central to firm	G10
35	Knowledge central to firm	G11
36	Knowledge-base activities considered in performance plans	I34
37	Learning about knowledge base	G6
38	Legal English training	I18
39	Legal opinions captured in database	I44

ID	Code	Data
40	Mentoring process	G56
41	Mentorship	G54
41	Mentorship	I40
42	Monthly case studies	G53
42	Monthly case studies	G53
42	Monthly case studies	I26
43	Most frequent used documents put in database	G86
44	No formal debrief after big cases	G98
45	No KM feedback to lower levels	G89
45	No KM feedback to lower levels	G90
46	Part of firm strategy	I14
46	Part of firm strategy	I16
47	Partner responsible for KM	G18
48	Person appointed to do KM	G28
49	Person dedicated to KM	G29
50	Regular lectures	G33
50	Regular lectures	G35
51	Rules around using database	G92
52	Training for candidate attorneys	G36
53	Weekly discussions with candidate attorneys	G52
54	Some processes unstructured	G93

APPENDIX I

FUNDAMO LIST OF CODES

ID	Code	Data
1	Brown-bag sessions	G81
		G82
		G83
		G94
		G88
		G92
2	Brown-bag sessions: interaction	G88
		G84
		G83
		G81
3	Close-out meetings: combination	I46
4	Considered an industry leader	G107
		I8
		I60
5	Documents: codification	G24
		G34
		I22
		I24
		I70
6	Focus on patent approval	G123
		G121
		I62
		I60
7	Formal mentoring process	G60
		G61
		G62
		G72
8	Growing company needs more formal processes	G9
		I2
		I14
9	Growing company needs more structured processes	I66
10	Implementing a wiki	G17
		G16
		G2
		I32
		I30
11	In process of appointing technical writer	G22
		I18
12	In process of changing strategy	G2

ID	Code	Data
13	Informal incentives in place	G51
		G52
14	Lacks document repository	G18
		G34
		G35
		G49
15	Lacks search functionality	I22
16	Learn from partners	G71
17	Need to formalise	G52
		G53
		G54
		I38
18	No integrated KM Function	I20
19	Pair programming	G59
		G58
		G57
		G56
		I40
		I41
20	Pair programming: interaction	G56
		G58
		I40
21	Partnerships: interaction	G73
22	Patents and trademarks managed formally	G121
		G123
23	Product innovation	I14
		I16
		I64
24	Reviving previous roles & responsibilities matrix	G114
		G111
25	Shared drive per business unit	I24
		I26
26	Strategy needs to be more formalised	G16
27	Streamlining documentation processes	I70
28	Structured product development processes	I68
29	Supports further studying	G70
		G73
30	Unstructured knowledge creation process	G117
		G118
31	Voluntary knowledge sharing	G86
32	Wiki	I72
33	Wiki: codification	G17
		G16
		G2
		I28
		I32
		I72

APPENDIX J
POLYCHEM LIST OF CODES

ID	Code	Data
1	All work driven via database	G27
		I30
2	Arbitrary knowledge sharing	G27
		G35
		G39
3	Assignments and follow-up via database	G24
4	Assignments obtained via database	G24
5	Customer information shared via Customer database	G98
6	Database for virually everything	G27
		G79
		G85
		G98
		I12
7	Database for virually everything	I36
8	Database used constantly	I18
9	Databases not updated frequently enough	G29
10	Different databases managed by functional managers	I30
11	Focus on process improvement	G74
		I74
12	Focused on better decision making	I22
		G15
13	Human intervention in knowledge coordination unstructured	G81
14	Improvement ideas sourced from knowledge base	G79
15	Incentives might encourage dumping of information	G36
16	Incentives unncessary	I44
17	Informal knowledge sharing via database	G93
18	Information distribution via databases	I86
19	Information logged in databases	G2
20	KM benefits linked to use of db at operational level	I22
21	KM centered around databases	I28
22	KM driven by Systems manager	G20
23	KM only driven through databases	G27
24	KM strategy equated to databases	I12
		I18
25	Knowledge about customers created via databases	G98
		I16
		I84
26	Knowledge made accessible via database	I76
27	Knowledge usage driven via database	G85

ID	Code	Data
		G90
28	Learning encouraged informally	G41
		G42
		G43
		I46
29	Lower-level mentorship	I40
30	Minutes from all meetings captured in database	I36
31	No documented KM strategy	I16
32	No formal feedback on KM initiatives	G83
33	No formal KM strategy	I14
34	No incentives in place	G33
35	Not dealing with tacit knowledge	I52
36	Off-site formal training by parent company	I50
37	Problem solving actions logged in workflow systems	I80
38	R&D technical reports stored in database	I24
39	Service requests pushed through database	G85
40	Software agents act as promts	I34
41	Structured visit reports	I84
42	Technology facilitates workflow	I34
43	Time pressure limit on learning oriented activities	I48
44	Uses logging systems	I80

APPENDIX K

FOURIER APPROACH LIST OF CODES

ID	Code	Data
1	Ad hoc learning	G39
		G71
2	Aim to capture knowledge in knowledge base	I20
3	Arbitrary integration	I54
4	Cannot happen by itself	I58
5	Capture experiences	G18
6	Capture knowledge in knowledge base	I54
7	Capture knowledge to forestall loss of experience	I40
8	Capture learning	G3
9	Captured knowledge not structured	G134
10	Client-team specific learning	G24
11	Concept-action tension	G10
12	Concept-technology gap	G11
13	Criteria not communicated	G124
14	Distributed work teams prohibits learning	G68
15	Document learning	G7
16	Document resigning colleagues' work	G71
17	Don't evaluate methodology as envisaged	I50
18	Duplication in portal	G129
19	Execution weak	G19
20	Exists at conceptual level	G18
21	Exists in theory	G31
22	Expect appraisal of knowledge submitted	G60
23	Fails at high-level	G136
24	Few company-wide sharing opportunities	G138
25	First step is to capture expertise	I52
26	Have never seen execution	G59
27	Inconsistend approaches to learning	I38
28	Innovation doesn't work here	G115
29	KM follow through is problematic	G18
30	KM function not executed adequately	G19
31	KM function not formally defined	I22
32	KM meaning unclear	G9
33	KM responsibilities unclear	G23
34	Knowledge base not moderated	G126
35	Knowledge creation not coordinated	G124
36	Knowledge in portal not coordinated	G126
37	Knowledge in portal not structured	G128
38	Knowledge trapped at client-site	I18
39	MD considers incentive as important	I36
40	Need a proactive coordinator	G133
41	Need someone to coordinate	G130

ID	Code	Data
42	No access to Portal from client site	G74
43	No evidence of coordination	G121
44	No formal execution	G122
45	No formal integration	G122
46	No formal learning processes	G23
47	No ownership of KM function	G20
48	No practical enforcement	G32
49	No structured integration process	I56
50	No utilisation	I54
51	Not accessible	G73
52	Not executed	I50
53	Not something that will happen by itself	I52
54	Not taken seriously	G62
55	Only share knowledge if prompted	G35
56	Ownership & responsibilities unclear	G9
57	Performance appraisal criteria unclear	G5
58	Portal access a recognised problem	G75
59	Portal access problematic	G76
60	Portal doesn't work for anyone	G27
61	Portal not considered useful	G22
62	Portal not used	G71
63	Portal used to capture knowledge	G5
64	Principles rather than strategy	I14
65	Processes are unstructured	G136
66	Proven is important	G118
67	Right thing to do is to capture in portal	G45
68	Stick to what is known	G112
69	Strategy not commnunicated	I18
70	Subjective measurement	G60
71	Suspect Portal is not used	I54
72	Technology problematic	I30
		I56
73	Technology too intricate	G40
74	That's the theory	I20
75	Theory vs reality	I32
76	Unclear about appraisal criteria	G125
77	Well-defined theoretically	G27
78	You should document it	G86

APPENDIX L

CEDAR & KIRK LIST OF THEMES

ID	Theme
1	KM part of business strategy
2	Formally promoted learning culture
3	Incremental incentives
4	Technology facilitates KM
5	Defined KM structure
6	Combined KM approach
7	Formal processes emerging
8	Dynamic capabilities

APPENDIX M

FUNDAMO LIST OF THEMES

ID	Theme
1	Emerging KM strategy
2	Emerging learning culture
3	Recognise need for incentives
4	Emerging KM technology
5	Undefined KM structure
6	Combined KM approach
7	Formal processes emerging
8	Dynamic capabilities

APPENDIX N

POLYCHEM LIST OF THEMES

ID	Theme
1	Undefined KM strategy
2	Arbitrary learning culture
3	Incentives deemed unnecessary
4	Facilitative KM technology
5	Technology-driven KM structure
6	Codification knowledge approach
7	Workflow-driven knowledge processes
8	Incremental capabilities

APPENDIX O

FOURIER APPROACH LIST OF THEMES

ID	Theme
1	Conceptual KM strategy
2	Arbitrary learning culture
3	Inconsistent incentives
4	Inadequate technology
5	Undefined KM structure
6	Codification knowledge approach
7	Uncoordinated knowledge processes
8	Static capabilities